VOL. VII AUGUST 1956 NO. 8

UNITED STATES ARMED FORCES MEDICAL JOURNAL

Published Monthly by
the Armed Forces Medical Publication Agency
Department of Defense

Editor
CAPTAIN BENNETT F. AVERY, MC, USN

Associate Editors
COLONEL PATRICK I. MCSHANE, MC, USA
LIEUTENANT COLONEL PAUL V. DAVIS, USAF (MC)

Assistant Editor
LIEUTENANT COMMANDER S. O. WAIFE, MC, USNR

UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1956

THE PRINTING OF THIS PUBLICATION HAS BEEN APPROVED BY
THE DIRECTOR OF THE BUREAU OF THE BUDGET, 20 FEB. 1956

Monthly Message

Alaska

At the beginning of World War II there were only one or two small military establishments in Alaska and the total population was only 39,000; now it is approximately 200,000 and we have a very large military establishment under the unified Alaskan Command, with headquarters in Anchorage. The Army and Air Force headquarters are at Fort Richardson and Elmendorf Air Force Base respectively, and the Alaskan Sea Frontier is based on Kodiak Island, some 200 miles to the southwest. The whole Command is active, constantly on the alert, and with high morale; and there are extensive airfields and warehouses, modern barracks and housing developments, and Arctic research and testing laboratories, as well as our early warning systems.

The United States purchased Alaska from Russia in 1867, but it required a world war to awaken us to the full extent of its potentialities. Although prehistoric races from Siberia landed on Seward Peninsula perhaps 25,000 years ago, modern colonization began in 1784 with Grigor Shelekhov, who traveled a similar route in sailing ships. In 1788 Alexander Baranov established a permanent colony on Kodiak Island with a small group of hardy PROMESHLENNIKI, or explorers. His explorations and fur trading extended all the way to northern California. He founded the old Russian capital at Sitka, which was completely destroyed by the Indians, but which was rebuilt again by him the following year and is still an active town of over 2,000 inhabitants.

Frank B. Berry

FRANK B. BERRY, M. D.
Assistant Secretary of Defense
(Health and Medical)

Table of Contents

Page

Experiences With a Trauma Ward: A Report on the First Six Months of Operation—*George L. Beatty and Edwin J. Pulaski* 1093

The "Unitarian Concept" of the Treponemal Diseases—*Samuel L. Moschella* 1101

Occurrence of Coxsackie Virus in the Hawaiian Islands—*Harvey L. Rubin, Sara E. Ransom, and Walter S. Price* 1109

The Nucleoli of Atypical Lymphocytes in Infectious Mononucleosis—*William W. Ayres* 1111

Obtaining a More Accurate Basal Metabolic Rate by Spirometer—*James C. Syner* 1121

Metabolic Diseases and Urinary Calculi—*Richard P. Spencer* 1129

Tumors of the Testis—*Claude C. Dodson and John A. Isherwood* 1138

Somnambulism: Psychiatric Interview Studies—*Chester M. Pierce and Harry H. Lipcon* 1143

Sebaceous Cyst: A Modified Method for Surgical Excision—*Daniel C. Belden* 1154

An Outline for a New Approach to the Problem of Highway Accidents—*Frederick L. McGuire* 1157

CLINICOPATHOLOGIC CONFERENCE

Fitzsimons Army Hospital, Denver, Colo. 1167

SERVICE ARTICLES

Army Laboratory Research in Tuberculosis—*Arthur F. Lincoln* 1181

Facilities for Military Patients With Burns or Acute Renal Failure: Air Evacuation and Specialized Treatment—*Robert D. Pillsbury, Paul E. Teschan, and Curtis P. Artz* 1190

Use of the Shelden Tracheotome in Military Medicine—*Benjamin L. Crue, Jr.* 1193

CASE REPORTS

Sensitivity to Furadantin—*Joseph Rebhun* 1196

The Use of Epiphyseal Stapling in Unusual Situations—*August W. Spittler and Robert J. Barnett* 1201

The Bender-Gestalt Test In a Patient Passing Through a Brief Manic-Depressive Cycle—*Edward J. Murray and Francis J. Roberts* 1206

Scleroderma Affecting the Masticatory Apparatus—*James E. Chipps and Victor R. Hirschmann* 1209

Repair of Meningomyelocele by Plastic Surgery—*Bernard N. Soderberg and John B. Sutton* 1214

Page

DEPARTMENTS

A Message From the A. M. A. 1217
Promotions of Officers 1219
New Officers of Military Medicine Section, A. M. A. 1223
Mayo Clinic Surgeon Appointed Rear Admiral, U. S. Naval Reserve 1224
New Air Force Hospital in Bermuda 1225
Correspondence 1228

BOOKS

Reviews of Recent Books 1229
New Books Received 1245

Foreword

The *United States Armed Forces Medical Journal* is the medium for disseminating information of administrative and professional interest to all medical personnel of the Department of Defense. The Assistant Secretary of Defense (Health and Medical) and the Surgeons General of the several services invite all medical officers, dental officers, Medical Service Corps officers, Nurse Corps officers, and officers of the Veterinary Corps of the Armed Forces, and the medical consultants of the Army, Navy, and Air Force to submit manuscripts for publication in this *Journal.*

FRANK B. BERRY, M. D.,
Assistant Secretary of Defense (Health and Medical).

MAJOR GENERAL SILAS B. HAYS,
Surgeon General, United States Army.

REAR ADMIRAL BARTHOLOMEW W. HOGAN,
Surgeon General, United States Navy.

MAJOR GENERAL DAN C. OGLE,
Surgeon General, United States Air Force.

UNITED STATES ARMED FORCES
MEDICAL JOURNAL

Volume VII August 1956 Number 8

EXPERIENCES WITH A TRAUMA WARD

A Report on the First Six Months of Operation

GEORGE L. BEATTY, *Colonel, MC, USA*
EDWIN J. PULASKI, *Lieutenant Colonel, MC, USA*

MOST EXPERIENCED surgeons are of the opinion that the patient with acute trauma receives less expert care, particularly during the early phase of treatment, than do other patients on surgical wards. Of the many reasons that may account for this, certain ones are readily apparent. Not infrequently there is less interest in trauma than in other aspects of surgery, and disproportionately less teaching of the subject to medical students and young doctors. Often there are certain administrative hospital routines and practices which are not in harmony with the best interests of the injured patient.

Surgeons, especially those in an older age group who are best qualified to care for injured patients, are so often occupied with full-time schedules that they do not find the time, energy, or interest to devote to traumatology. The younger surgeon, focusing primarily on elective surgical procedures, is less attracted toward the accident patient, whose condition, time of arrival, and time required for initial definitive treatment are unpredictable. Due to awareness of these deficiencies, recently some medical schools have, as a result of the MEND (Medical Education for National Defense) program, added to their curricula the subject of trauma. Prior to this, medical students had little or no opportunity to acquire academic knowledge or clinical experience in this field. Similarly, there was lack of opportunity for the recent medical school graduate to acquire formal knowledge and skill in the management of acutely injured patients during internship. There are a number of hospitals having accredited residencies in general surgery which do not accept accident cases. In many other residency training programs trauma is given a subordinate role.

From Tripler Army Hospital, APO 438, San Francisco, Calif.

Because of the fact that trauma is a daily concern, training in this field should be a part of the background of every general surgeon.

Most hospitals have fairly uniform and established routines for admitting nontraumatic cases. The patient with a contagious disease, for example, is admitted to a contagion ward; the patient with injury of the eye only is admitted to a ward designated for eye patients. Certain trauma cases, however, particularly those with multiple injuries, may be admitted at random to any of a number of surgical wards, where the results of treatment may vary from good to poor, depending on the interest or experience of the individual ward officer. The efficiency of consultants from other surgical subspecialties is compromised when these specialists are required to go from ward to ward and try to maintain liaison with a number of different ward surgeons. The difficulties of establishing priorities for treatment and assigning responsibility for the over-all care of the patient are thereby increased. This diffusion of patients in a number of wards makes the study of their lesions not only a matter of inconvenience but tends to promote the disinterest of the staff.

Realization of these problems led us to the concept that formal training in traumatology should be a part of a general surgical residency program and that this training should be continuous throughout the period of residency. In order to make this as effective as possible, the one basic requirement seemed to be the establishment of a trauma ward, wherein certain acutely injured patients could be concentrated for care, study, and teaching. By this device it was hoped that greater interest in the subject would be elicited, and the care given to the injured patient improved.

The medical officers in our department agreed that the end results of treatment of acute injury cases could be improved. The subject was discussed in detail. It occurred to several of them that establishment of a trauma ward would help to overcome many of the problems we had observed heretofore in the care of injured patients scattered throughout our surgical wards. The idea was not new. Several officers recalled their experiences in the field during the recent wars and in previous peacetime assignments where they had observed trauma wards used more for convenience than for teaching. There was general agreement that better overall control of injured patients could be maintained if they were housed in one ward, with particular emphasis on resuscitation, optimal and continuous care from admission to discharge, uniform pattern of management, and careful evaluation of end results. Administratively the matter of public relations would be simplified.

SIZE AND LOCATION OF TRAUMA WARD

A trauma ward was therefore established at this hospital on 1 July 1955. No changes or additions in its basic structure were required. No expense was involved. The ward chosen was located on the third floor, which housed the operating suite and the general surgical wards. It was easily accessible by elevator from the receiving office which was on the first floor. The entrance to the ward was only a few paces from the operating suite. Its proximity to the operating room was an important feature. The ward accommodated 35 beds. Four cubicles contained five beds each; five small rooms had two beds each, and one larger room had five beds. Just inside the entrance to the ward was a room with four beds, used for patients admitted in shock. It was not a part of the plan to have a ward just this size. It might have been larger or even smaller and still have been useful for this purpose. Its location near the operating rooms and the fact that it contained a number of smaller rooms, thus providing privacy and protection of burned patients from drafts, were deciding considerations in its selection.

ADMISSIONS TO TRAUMA WARD

The majority of patients admitted were classified as general surgical or neurosurgical. These two groups included those who had incurred some type of injury of the soft tissues, with or without head injury and with or without fractures. For this reason there was a definite advantage in having patients with soft-tissue trauma and with neurosurgical injuries on the same ward. Thus, 20 per cent of all admissions to this ward fell into this category. Three hundred and sixty-eight patients were admitted during the six-month period covered by this report, an average of 61 admissions per month. They were classified as follows: 186, general surgical; 160, neurosurgical; 16, thoracic surgical; 1, gastrointestinal; 1, vascular; and 4, miscellaneous.

Table 1 lists the 430 recorded diagnoses for the 368 patients, many of whom had multiple injuries. For the six-month period covered by this report, the patients admitted to the trauma ward comprised 27 per cent of all hospitalized injury cases and 7 per cent of all patients admitted to the department of surgery for the same period.

ADMISSION OF TRAUMA PATIENTS TO OTHER WARDS

Not all injured patients were admitted to the trauma ward. Children up to 12 years of age and women were admitted to the trauma ward only if they were unconscious or in shock; otherwise, they were admitted to their respective wards. Patients with single injuries that clearly placed them in a special category were admitted to specialized wards; for example, those with injuries of

the eye were admitted to the eye, ear, nose, and throat ward; fracture patients with no associated injury were admitted directly to an orthopedic ward.

PERSONNEL

One medical officer in his first year of general surgical residency was assigned as ward officer. One intern was assigned as assistant ward officer. The neurosurgeon of the hospital staff, whose office and clinic were located on this ward, supervised the management of patients with neurosurgical trauma. The overall management of the ward was supervised by the fourth year general surgical resident and the chief of the general surgical service. The normal complement of nurses and enlisted and civilian attendants for a ward of this size was assigned and was augmented as necessary.

TABLE 1. *Classified diagnoses in 368 trauma patients*

Diagnoses	Number
Contusions and abrasions	56
Lacerations:	
Head	49
Upper extremity	39
Thorax	10
Lower extremity	30
Amputations (digits)	16
Penetrating wounds:	
Stab	14
Gunshot	17
Foreign body	4
Bites (human and animal)	5
Burns (thermal, electrical, chemical)	27
Unconsciousness:	
Brain concussions	76
Brain contusions	5
Alcohol, intoxication	18
Peripheral nerve injuries	10
Fractures:	
Skull and facial bones	17
Thorax or vertebrae	8
Extremities	14
Sprains	11
Dislocations	4
Total	430

SHOCK ROOM

Certain supplies and items of equipment, in addition to those found on any surgical ward, were provided in the shock room for emergency use. These included inhalation anesthesia and oxygen apparatus, mouth gag, tourniquet, intravenous fluids including plasma volume expanders, emergency sterile operating linen packs, antidotes for poisons, restraints, splints, traction apparatus, portable x-ray apparatus, complex suture set, lumbar puncture set, catheterization tray, tracheotomy set, and suction apparatus.

GENERAL OPERATION OF THE TRAUMA WARD

Those patients who were in shock on admission were kept in the shock room and given the necessary resuscitative treatment. When vital signs were stabilized and the patient's condition permitted, he was moved from the shock room to a private room or to a bed in the open ward. It was part of the original plan that the patients would remain in the trauma ward during their period of definitive treatment. This period of treatment might vary from a few days to two or more weeks. The number of new patients that the ward could accommodate each month was determined by the length of time the patients remained on the ward. The 368 acutely injured patients admitted during the six-month period remained in the trauma ward for an average of 12 days. When a patient had recovered from his injuries, he was discharged to duty. If he was still unable to perform full military duty, he was transferred to a convalescent ward, but continued in the charge of the ward surgeon of the trauma ward. If all the beds in the trauma ward were occupied, vacant beds were made available for new admissions by transferring to convalescent wards those patients who required the least amount of active treatment. By this means the capacity of the trauma ward was readily adjustable to the number of patients who required treatment in this ward. The ward operated consistently at or near its capacity during the period covered by this report.

The patient with multiple injuries often required the attention of an ophthalmologist, an orthopedist, or other specialist. The specialist continued to treat the patient until he had recovered. If the patient recovered first from his general injuries but needed further treatment by a specialist, he was transferred to the appropriate ward. The ward surgeon of the trauma ward was encouraged to make full use of the consultants of other services and to maintain close liaison with them on every case. By this means the ward surgeon gained considerable experience in trauma of the various surgical subspecialties. It was often possible for the ward surgeon to relieve the specialist of routine duties. The ward surgeon thus was able to expand his knowledge and skill in the over-all care of injured patients.

DISCUSSION

The advantages of the trauma ward became apparent soon after it was functioning. Especially noteworthy was the intense interest in trauma aroused in the intern and resident staff. Several officers remarked that the teaching ward rounds enabled them to harmonize their ideas with what they had learned in medical school and elsewhere, to put to practical use their newly implemented knowledge. There was a greater tendency on the part of the younger officers to determine existing policy and proper treatment before improvising regimens about which there was some doubt. The mere existence of the trauma ward made them conscious of the wrong and right methods of handling acutely injured patients. There was a notable improvement in the care given to the injured patients coming to the hospital, especially during the night.

It is believed that a trauma ward is best operated by a general surgical service. Such an arrangement affords all officers on the service an opportunity to acquire first-hand experience in traumatology. This training is initiated during their first year of the residency, during which time three months are spent on the trauma ward. Throughout the entire four years of the residency each trainee serves as a member of an emergency surgical team. Such teams are composed of two interns and two residents in their second and third years of training, as well as assigned staff members. In effect, trauma is taught and practiced throughout the tenure of the residency period.

Whereas there has been no attempt to train medical officers to be "accident specialists" in the sense of an assignment, we are endeavoring to graduate the surgical resident with a firm foundation in the care of the acutely injured patient. Emphasis has been placed on the care of the wound throughout the entire period of healing and restoration of function. Complications of wound healing are studied closely and the means of prevention are constantly being sought. Prevention of infection and other factors which delay wound healing are stressed. The trauma ward provides the workshop for the fabrication of these principles.

Gissane[1] has pointed out that when an injured patient is first seen he suffers only the result of his injury. If it is possible, immediate treatment with a view to achieving a definite functional result should be instituted before infection, postural deformity, and other complications have occurred. He stated that accident surgery is the acute phase of both plastic and orthopedic surgery. At our hospital the majority of the accident cases are cared for by general surgical residents who also receive several months' training in orthopedics. In the process of their training they also acquire knowledge of the basic plastic surgical procedures. The young general surgeon soon acquires the ability to cope with most of the problems seen in the trauma ward. He is encouraged

to maintain close liaison with other services which will be concerned not only with the emergency but also with the later special treatment. The officers of the various surgical subspecialties are intimately concerned with the trauma ward when their services are required. Without them the team effect and much valuable training are lost. Military hospitals with a representation of such assigned specialists are thus easily adaptable to the establishment and operation of a trauma ward.

The functions of a trauma ward, as brought to light by our experience, may be expressed as follows:

1. *To ensure the prompt and efficient treatment of acutely injured patients.* The admission and segregation of acutely injured patients in a single ward conveniently located near the operating suite facilitates provision of the indicated treatment. Unlike injured patients who are scattered throughout the hospital, the injured patients in a trauma ward are not neglected but are given undivided attention and continuous care by the same group of surgeons. Administrative and professional functions are greatly simplified.

2. *To focus special attention on trauma.* Establishment of a trauma ward has served to place trauma on the same level of importance as elective surgery, as evidenced by the interest displayed by the officers of the department of surgery as well as by the nurses and enlisted and civilian ward attendants. The pride of achievement of good results has had a stimulating effect on all concerned.

3. *To concentrate in a single ward for purposes of convenience the clinical material on trauma for teaching purposes.* Teaching ward rounds are conducted regularly on the trauma ward. All medical officers and attendants have an opportunity to critically evaluate and compare the results of management of many patients presenting the same or similar lesions. Concentration of injured patients in one ward makes it possible to devote each teaching period to one or more facets of the trauma problem. For example, the local care of the burn wound, or the management of patients with severed tendons, may be suitable subjects for discussion when a number of patients with these types of injuries are in the ward.

4. *To develop by close observation and documentation methods of improving the care of acutely traumatized patients.* Special attention has been given to the maintenance of detailed clinical records on all injured patients. Special efforts are made to implement clinical records by serial photographs, roentgenograms, bacteriologic studies, and other ancillary pertinent data. The accumulated material is put to use in the preparation and presentation of papers at medical meetings, and particularly at the

Symposium on Trauma which the department of surgery is conducting this year. Periodic study and analysis of the experiences gained through operation of the ward point the way to clinical investigation in these areas.

5. *To prepare military personnel to cope with large numbers of casualties resulting from mass disasters.* A trauma ward in a military hospital is an invaluable proving ground for many of the problems to be expected in caring for large numbers of injured patients occurring either in peacetime or in time of war. The basic lessons learned may be readily translated to operations of greater magnitude. Such adjustment both in war and in peace is one that is required of all components of the military in an emergency.

SUMMARY AND CONCLUSIONS

A trauma ward was established at this hospital because of the large numbers of acutely injured patients requiring hospitalization. A report on the first six months of its operation indicates that the majority of patients treated were those with soft-tissue injuries, with or without cerebral trauma and with or without fractures. Three hundred and sixty-eight patients with 430 recorded diagnoses were admitted and treated in this period. The average stay on the ward was 12 days.

Experiences to date suggest that the functions of a trauma ward are: (a) to ensure the prompt and efficient treatment of acutely injured patients; (b) to focus special attention on trauma; (c) to concentrate injured patients in a single ward for purposes of convenience, uniformity of treatment, teaching, and study; (d) to develop, by close observation and documentation, methods of improving the care of acutely traumatized patients; and (e) to prepare military personnel to cope with large numbers of casualties resulting from mass disasters.

It was concluded that: (1) A trauma ward is of definite value in a military teaching hospital caring for significant numbers of acutely injured patients, and should be a part of the general surgical service. (2) All general surgical officers should be rotated in their assignments through the trauma ward and be given continuing opportunities to participate in the care of injured patients. (3) The trauma ward should be adequate in size and conveniently located with relation to the receiving office, operating suite, and radiology department. (4) Space, supplies, and equipment for treating patients in shock should be a part of the trauma ward.

REFERENCE

1. Gissane, W.: Thoughts on clinical organisation of regional accident service. *Brit. J. Plast. Surg.* 2: 224-232, Jan. 1950.

THE "UNITARIAN CONCEPT" OF THE TREPONEMAL DISEASES

SAMUEL L. MOSCHELLA, *Lieutenant Commander, MC, USN*

ARE YOU a "lumper" or a classifier? Many of the controversial overlapping clinical signs and symptoms seen in the various treponemal infections become less controversial if one could accept the possibility of these being various clinical reaction patterns of one disease. About four decades ago this concept was suggested by Hutchinson[1] and Stitt.[2] Hudson[3,4] subsequently elaborated and described it as the "unitarian concept" of treponemal diseases. For years it received little attention in the United States and much resistance outside them.

What is this concept? It maintains that all treponematoses—syphilis, yaws, pinta, bejel, njovera, colonial native syphilis of the French, endemic syphilis of Bosnia and Herzegovina, medieval syphilis, and other endemic syphiloid infections—are clinical entities or syndromes. They are caused by various strains of *Treponema pallidum,* whose clinical behavior has been physiologically conditioned by environmental influences, the passage of time, and the infected races. The environmental influences on *T. pallidum* are the climate, the customs and habits of the people, the general hygienic status, and the endemic diseases. Some physicians feel that the economic factor and the way of life are responsible only for the distribution of these diseases. Turner[5,6] believed that each disease results from a different causative agent with inherent biologic differences and offers his rabbit inoculation studies as evidence. However, he was unable to diagnose 55 out of 380 patients as being infected with either syphilis or yaws. Hudson[3,4] did not accept the geographic and clinical differences of these infections as the basis for a biologic classification, but emphasized the morphologic as well as the immunologic similarities.

In 1932, Blacklock,[7] in comparing yaws and syphilis, stated that it was time to stop "flogging a dead horse." However, in view of the recent literature and new advances in medicine, the controversial "dead horse" merits resurrection and re-examination.

From U. S. Naval Hospital, Navy 115, FPO, New York, N. Y.

This paper was read in Spanish before a joint meeting of the Medical Society of Santiago de Cuba and its guests, the physicians of the U. S. Naval Hospital, Guantanamo Bay, Cuba, on 11 December 1955.

Under the electron microscope there are no morphologic differences in the organisms causing syphilis, yaws, pinta, and bejel. When comparable lesions of the various accepted diseases are examined histologically, there are no obvious or definite differences. Williams[8] and Ferris and Turner[9] were unable to give definite and reliable histologic criteria for differentiating the cutaneous and subcutaneous lesions of yaws and syphilis.

A review of the clinically significant similarities and dissimilarities of the more common syphiloid infections[10] may enhance one's appraisal of Hudson's[3,4] attempt to identify these as clinically dynamic variants of one disease. All these treponemal entities have in common, to some degree, early and late manifestations with an intervening period of latency. However, only syphilis allows itself to be sharply divided into clinical stages. Applied to yaws and pinta the term "primary" is self explanatory, but the "secondary" and "tertiary" stages are not so clear and do not explain the co-existence of these different stages. In yaws, Hill, Kodijat, and Sardati[11] were unable to accept the arbitrary divisions suggested by Spittel[12] that the secondary stage extends to three years after the primary lesion and that the tertiary stage extends beyond the three years. Hasselmann[13] stated that the novice must be cognizant of the polymorphous nature of both the course and the skin manifestations of yaws.

The chancre complex, an indurated ulcer with a satellite node as the initial lesion of a spirochetal infection, is only demonstrable in primary syphilis. The congenital transmission of syphilis probably stems from the infection of adults in the childbearing age. The absence of plantar hyperkeratosis has been attributed to the wearing of shoes. In the past the significant incidence of visceral involvement in syphilis may have been due to a modified biologic response conditioned by the low incidence of the disease, the predominance of adult infection, and treatment. Wilcox[14] believed that if any discrepancy does exist in the relative incidence of central nervous system syphilis in the African Negro after adequate spinal fluid examination, it is only due to the endemic malaria.

Yaws, unlike syphilis, is not associated with congenital transmission, alopecia, mucous membrane lesions, eye lesions, or nervous or cardiovascular lesions. However, Hackett[15] reported a 5 per cent incidence of mucous membrane lesions. Turner[5] regarded the protracted generalized eruption of yaws the most outstanding difference between it and syphilis. There is a greater incidence of juxta-articular nodules and gangosa in yaws and bejel than in syphilis. The depigmentary lesions of yaws and bejel are late manifestations and can simulate pinta.[16]

Yaws may leave permanent scarring and keloid formation in contrast to the other treponemal infections.

Bejel,[17-19] "yaws of the desert," is a nonvenereal type of syphilis in a group of people in whom the diseases of yaws and syphilis can be excluded. Like yaws, it does not have a congenital transmission or a chancre lesion, and the presence of visceral involvement is controversial. Stannus[20] stated that yaws occurs exclusively in dark-skinned peoples while bejel affects Semitic peoples. There is plantar hyperkeratosis, patchy alopecia, juxta-articular nodules, bone involvement, and the tendency to disappear when brought into contact with civilizing influences.[21] Varela[22] stated that bejel, like syphilis, has spinal fluid changes, central nervous system symptoms, and transplacental reaginemia. Like syphilis, 30 per cent of the untreated patients may develop late signs. These may be manifested by gumma, nasopalatine lesions, periostitis, laryngeal lesions, and pigmentary disturbance. Since bejel is contracted in an arid climate, the eruption is predominantly flexural and resembles, in distribution and character, the cutaneous lesions of yaws in less humid areas.[23] Wilcox[24] described njovera as endemic syphilis of Southern Rhodesia and probably identical with bejel.

Pinta[25-27] begins with an extragenital papule and develops a disseminated secondary eruption that may be indistinguishable from that of other spirochetal infections. It is not congenitally transmitted. Leon Blanco and de Laosa[28] reported late mucosal lesions resembling an achromic and erythematous stomatitis areatus. There are plantar and palmar hyperkeratoses, juxta-articular nodules, lymphadenopathy, and evidence of cardiovascular and spinal fluid changes. The Cuban type of pinta has a greater tendency to visceral involvement than the Mexican type. Allen and Goodale[29] described pinta-like lesions among the natives of Guam, which is an endemic area of yaws. Fox[30] stated that there are no bone lesions or gangosa in pinta. If one accepts the above, he must assume that when dyschromia is associated with bone lesions or gangosa, it is due to yaws or bejel, not pinta. The question arises: Are we elevating a clinical sign, dyschromia, to the position of a disease?[3]

At present, any attempt to unify these treponemal infections on an immunologic basis is fraught with many obstacles. There is available neither an animal which is suitable for experimental study nor a serologic test that can measure immunity in man or animal. There is a considerable amount of epidemiologic evidence that syphilis is rare in regions where yaws is endemic and that an attack of yaws confers an immunity to syphilis. Turner[6] stated that syphilis confers an immunity to yaws which is as great as, if not greater than, that conferred by yaws itself.

Leon Blanco[31] observed a slower development of pinta in syphilitic patients as well as a slowness or failure of pinta lesions to develop in patients with yaws. Experiments with monkeys convincingly demonstrate a reciprocal immunity between yaws and syphilis: it has been demonstrated that monkeys with syphilis develop immunity to both yaws and syphilis earlier than do those initially infected with yaws.[32] The experiments on rabbits have been less conclusive. Contrary to earlier reports, Leon Blanco and Oteiza[33] successfully inoculated rabbits with pinta.

The exact relationship of the treponemal immobilizing antibody to immunity is not yet clear. The studies carried out with rabbits and mice have been controversial and the different results variously explained. Khan, Nelson, and Turner[34] found experimentally a high cross-immobilizing reactivity between *T. pallidum* and *Treponema pertenue*. They felt that these two treponemes were closely related antigenically. In their preliminary studies in experimental syphilis, Turner and Nelson[35] showed that the immobilizing antibody titer approximately parallels immunity to re-infection; they speculated that the above may occur in yaws. These results appeared to substantiate serologically the immunologic observations in man and experimental animals. Turner and Nelson offered to explain the differences in the clinical patterns of the treponemal diseases as being due to some antigenic differences that are not detectable by the present immobilization test or other biologic properties of the spirochetes. However, McLeod and Magnuson[36] and Magnuson, Thompson, and McLeod[37] were unable to demonstrate a close relationship between the strains of syphilis and yaws spirochetes in a protective sense in spite of demonstrating cross immobilization. They described the immobilizing antibody as a group antibody which is related to reagin, most active against the homologous strains of spirochetes, and produced by an antigen common to different strains and species of treponemes. They believed that to identify immunity in man with the immobilization test would be subject to much controversy, that the acquired immunity to syphilis may be due to other antibodies not assayed in the immobilization test, and that the role of nonhumoral factors must be seriously considered. They[38] were able to produce immobilizing antibodies by injecting rabbits and mice with killed organisms; however, they were unable to demonstrate an accompanying immunity to *T. pallidum*. This was submitted as additional evidence that the Treponemal Immobilization (T. P. I.) Test does not represent the protective mechanism in experimental syphilis. Kahn and Gutierrez Villegas[39] demonstrated that the universal serologic reaction in Mexican pinta was identical with the pattern given by yaws.

Nell[40] demonstrated that the treponemes isolated from the diseases of syphilis, yaws, and bejel exhibit a similar in vitro response to penicillin. On the basis of clinical response and easy use for mass therapy, Rein, Kitchen, and Petrus[41] believed that repository penicillin is the drug of choice in the treatment of yaws. There was complete healing of all lesions within three months. However, the serologic response to penicillin was much slower and less satisfactory than in early syphilis. Greater amounts of penicillin did not significantly alter the incidence of serologic cures. For pinta, Rein and associates[42] noted that 1,190 mg (1,200,000 units) of crystalline procaine penicillin G in oil with 2 per cent aluminum monostearate given intramuscularly resulted in serologic improvement in 52 per cent of patients, disappearance of pintids in 68.9 per cent, and no improvement of late lesions in 9.9 per cent. In bejel, Csonka failed to cure skeletal involvement with 1,190 mg and suggested 2,380 mg (2,400,000 units). Following adequate treatment of a group of unselected cases of bejel, Csonka found that 31 per cent of the patients became serologically negative within a year in contrast to 15.8 per cent of a clinically similar group of patients with pinta reported by Rein and co-workers.[42] In yaws Ampofo and Findlay[43] found that the action of Aureomycin (brand of chlortetracycline hydrochloride) was somewhat slower than penicillin; however, Lins and associates[44] observed that oral administration of Aureomycin has an immediate therapeutic action comparable to that of penicillin. Ampofo and Findlay prefer Aureomycin for mass therapy since no intramuscular injection is required. Lins and co-workers observed complete healing of yaws lesions in from 15 to 16 days with 4.55 grams of Aureomycin for infants and 24 grams for adults. Loughlin and Joseph[45] considered Terramycin (brand of oxytetracycline) to be more effective than penicillin in the early phases of yaws. They believed that the incidence of infectious relapse is much less than that observed after treatment with penicillin. It appears that, like syphilis, the dosage for optimum therapeutic effect is dictated by the phase of the treponemal infection. A larger amount of the antibiotic, given over a longer period of time, is required in the late phase of the infection or in the presence of visceral involvement.

No disease has ever been treated out of existence; therefore, in spite of the presence of very effective drugs, supplementary long-term measures are necessary. Resurveys of entire populations for relapse or re-infection should be carried out at intervals of no less than 6 to 12 months for several years. Serologic tests should be used systematically for primary control. It is also desirable to treat routinely contacts of the infectious patients so that the reservoir of infectiousness will be shrunk

392347 O - 56 - 2

and the spread of infection will be slowed down. However, in the countries where these infections prevail, the socio-economic situation is such that a well-established and maintained control setup may take years to be developed. In the interim, periodic routine mass therapy may be the answer.

SUMMARY AND CONCLUSIONS

In spite of the recent advances in medical science, Hudson's "unitarian concept" still remains speculative and provocative. Although the treponemes appear morphologically indistinguishable under the electron microscope, there has not been demonstrated sufficient biologic, immunologic, or experimental evidence to warrant unanimous acceptance of Hudson's concept. A comparison of the various clinical expressions of these diseases re-emphasizes the fascinating possibility that they may be clinical entities or syndromes. This approach is consistent with modern medicine's attempt to form a dynamic concept of disease in order to comprehend its origin and evolution. Upon review of the literature, one gathers the impression that where pinta is endemic, the unitarian concept is least accepted; that where bejel is endemic, the concept is most acceptable; and that where yaws is endemic, there are mixed reactions.

The treponemal immobilization antibody appears to be produced by an antigen common to the different strains and species of the treponemes and appears to be no measure of immunity. Repository penicillin, Aureomycin, and Terramycin are very effective in the treatment and control of these treponemal infections. The principles for effective therapy parallel those experienced in the treatment of syphilis. The successful control of these diseases will require a well-established program and adequate physical facilities. Until the socio-economic level of the infected countries is raised sufficiently to afford such a setup, periodic mass therapy is the temporary solution.

REFERENCES

1. Hutchinson, J. H.: Introduction, In Power, D., and Murphy, J. K. (editors): *A System of Syphilis.* Vol. 1. Oxford University Press, London, 1908.

2. Stitt, E. R.: *The Diagnostics and Treatment of Tropical Diseases.* 2d edition. P. Blakiston's Son & Co., Philadelphia, Pa., 1917. pp. 343-353.

3. Hudson, E. H.: Treponematosis. In Christian, H. A. (editor): *Oxford Loose-Leaf Medicine.* Oxford University Press, New York, N. Y., 1945. Vol. 5. Part II, pp. 656 (9)-656 (122).

4. Hudson, E. H.: Yaws and syphilis; same or different? Should discussion be continued? *Am. J. Trop. Med.* 21: 545-552, July 1941.

5. Turner, T. B.: Studies on relationship between yaws and syphilis. *Am. J. Hyg.* 25: 477-506, May 1937.

6. Turner, T. B.: Resistance of yaws and syphilis patients to reinoculation with yaws spirochetes. *Am. J. Hyg.* 23: 431-448, May 1936.

7. Blacklock, D. B.: Yaws and syphilis. *Ann. Trop. Med.* 26: 423-455, Oct. 1932.

8. Williams, H. U.: Pathology of yaws, especially relation of yaws to syphilis. *Arch. Path.* 20: 596-630, Oct. 1935.

9. Ferris, H. W., and Turner, T. B.: Comparative histology of yaws and syphilis in Jamaica. *Arch. Path.* 24: 703-737, Dec. 1937.

10. Triana, J. A.: Étude schematique et comparative de la syphilis, du pian, et du mal del pinto. *Ann. dermat. et syph.* 9: 276, 1949.

11. Hill, K. R.; Kodijat, R.; and Sardati, M.: Atlas of frambesia; nomenclature and clinical study of skin lesions. *Bull. World Health Organ.* 4: 201-246, 1951.

12. Spittel, R. L.: Framboesia Tropica (Parangi of Ceylon). London, 1923.

13. Hasselmann, C. M.: Experimental evidence and clinical studies as basis for nomenclature in Frambesia tropica (yaws). *A. M. A. Arch. Dermat. & Syph.* 66: 107-122, July 1952.

14. Wilcox, R. R.: Some observations on neurosyphilis in African Negro. *J. Ven. Dis. Inform.* 32: 229, 1951.

15. Hackett, C. J.: Gaps in knowledge of yaws. *Tr. Roy. Soc. Trop. Med. & Hyg.* 43: 311-316, Nov. 1949.

16. Guimaraes, F. N.: Manifestacões boubáticas discromicas simulando pinta ("carate, mal del pinto, purú-purú"). *Brasil med.* 61: 81-87, Mar. 22-29, 1947.

17. Hudson, E. H.: Bejel; nonvenereal syphilis. *Arch. Dermat. & Syph.* 33: 994-1011, June 1936.

18. Hudson, E. H.: Bejel; endemic syphilis of Euphrates Arab. *Tr. Roy. Soc. Trop. Med. & Hyg.* 31: 9-44, June 1937.

19. Csonka, G. W.: Clinical aspects of bejel. *Brit. J. Ven. Dis.* 29: 95-103, June 1953.

20. Stannus, H. S.: Discussion in Hackett, C. J.: Clinical course of yaws in Lango, Uganda. *Tr. Roy. Soc. Trop. Med. & Hyg.* 40: 206-227, Dec. 1946.

21. Hudson, E. H.: Hyperkeratoses and depigmentation in bejel. *Ann. Trop. Med.* 30: 3-6, Apr. 1936.

22. Varela, G.: Problemas en relación con el pinto, pian y bejel. *Prensa méd. mex.* 17: 119-122, June 1952.

23. Chambers, H. D.: Warmth and humidity as predisposing factors in incidence of yaws. *Tr. Roy. Soc. Trop. Med. & Hyg.* 31: 451-456, Jan. 1938.

24. Wilcox, R. R.: Njovera; endemic syphilis of Southern Rhodesia; comparison with bejel. *Lancet* 1: 558, 1951.

25. Pardo-Castello, V., and Ferrer, I.: Pinta; mal del pinto; carate. *Arch. Dermat. & Syph.* 45: 843-864, May 1942.

26. Holcomb, R. C.: Pinta, a treponematosis; review of literature. *U. S. Nav. M. Bull.* 40: 517-552, July 1942.

27. Villela, E.: Pinto y pinta. *Medicina,* Mexico 32: 34-38, Jan. 25, 1952.

28. Leon Blanco, F., and de Laosa, O.: Lesions of oral mucosa in late phase of pinta (carate, mal de pinto), with demonstrations of treponemes in histologic sections. *Bol. Soc. Cubana de dermat. y sif.* 4: 152, 1947.

29. Allen, R. F., and Goodale, R. H.: Pinta-like lesions among natives of Guam. *U. S. Nav. M. Bull.* 46: 653-662, May 1946.

30. Fox, H.: Yaws, cutaneous leishmaniasis, and pinta. *J. A. M. A.* 123: 459-462, Oct. 23, 1943.

31. Leon Blanco, F.: Transmission of experimental pinta to patients with yaws; results in 9 cases. *J. Invest. Dermat.* 8: 123, 1947.

32. Schöbl, O., and Miyao, I.: Immunologic relation between yaws and syphilis. *Philippine J. Sc.* 40: 91-109, Sept. 1929.

33. Leon Blanco, F., and Oteiza, A.: Experimental transmission of pinta, mal del pinto, or carate to rabbit. *Science* 101: 309-311, Mar. 23, 1945.

34. Khan, A. S.; Nelson, R. A., Jr.; and Turner, T. B.: Immunological relationships among species and strains of virulent treponemes as determined with treponemal immobilization test. *Am. J. Hyg.* 53: 296-316, May 1951.

35. Turner, T. B., and Nelson, R. A., Jr.: Relationship of treponemal immobilizing antibody to immunity in syphilis. *Tr. A. Am. Physicians* 63: 112-117, 1950.

36. McLeod, C. P., and Magnuson, H. J.: Study of cross-immunity between syphilis and yaws in treated rabbits. *J. Ven. Dis. Inform.* 32: 305-309, Nov. 1951.

37. Magnuson, H. J.; Thompson, F. A., Jr.; and McLeod, C. P.: Relationship between treponemal immobilizing antibodies and acquired immunity in experimental syphilis. *J. Immunol.* 67: 41-48, July 1951.

38. McLeod, C. P., and Magnuson, H. J.: Production of immobilizing antibodies unaccompanied by active immunity to Treponema pallidum as shown by injecting rabbits and mice with killed organisms. *Am. J. Syph.* 37: 9-22, Jan. 1953.

39. Kahn, R. L., and Gutierrez Villegas, L.: Universal serologic reaction in pinta. *Am. J. Syph.* 36: 468-475, Sept. 1952.

40. Nell, E. E.: Comparative sensitivity of treponemes of syphilis, yaws, and beiel to penicillin in vitro, with observations on factors affecting its treponemicidal action. *Am. J. Syph.* 38: 92-106, Mar. 1954.

41. Rein, C. R.; Kitchen, D. K.; and Petrus, E. A.: Repository penicillin therapy of yaws in Haitian peasant; clinical and serologic survey. *J. Invest. Dermat.* 14: 239-246, Apr. 1950.

42. Rein, C. R.; Kitchen, D. K.; Marquez, F.; and Varela, G.: Repository penicillin therapy of pinta in Mexican peasant; clinical and serological survey. *J. Invest. Dermat.* 18: 137-145, Feb. 1952.

43. Ampofo, O., and Findlay, G. M.: Aureomycin in treatment of yaws and tropical ulcer in Africa. *Nature*, London 165: 398-399, Mar. 11, 1950.

44. Lins, S. A.; Guimaraes, F. N.; Vasconcellos, P.; and Miranda, J. L.: Accão da aureomicina no tratament da bouba (framboesia, pian, yaws). *Rev. brasil med.* 7: 439-442, July 1950.

45. Loughlin, E. H., and Joseph, A.: Terramycin in treatment of yaws. *Antibiotics & Chemother.* 1: 76-87, Apr. 1951.

INTERNATIONAL CANCER CYTOLOGY CONGRESS TO BE HELD IN OCTOBER

The 1956 International Cancer Cytology Congress, sponsored by the American Society of Clinical Pathologists, the College of American Pathologists, the Intersociety Cytology Council, and the International Union Against Cancer, will be held at the Drake Hotel in Chicago, Ill., 8 to 13 October 1956.

The general theme of the Congress will be Exfoliative Cytology, and the program will stress but not be devoted exclusively to the subject.

During this period three of the sponsoring organizations, with a combined membership of approximately 3,000 pathologists and other physicians, will hold their annual meetings:

The College of American Pathologists, the evening of Monday, 8 October.

The Intersociety Cytology Council, the evening of Wednesday, 10 October.

The American Society of Clinical Pathologists, the evening of Thursday, 11 October.

For information address: Dr. A. H. Dearing, Executive Secretary, College of American Pathologists, Prudential Plaza, Chicago 1, Ill.,

OCCURRENCE OF COXSACKIE VIRUS IN THE HAWAIIAN ISLANDS

HARVEY L. RUBIN, *Lieutenant Colonel, VC, USA*
SARA E. RANSOM, *M. S.*
WALTER S. PRICE, *Major, MC, USA*

ISOLATIONS of viruses of the Coxsackie group have been reported from many parts of the Western Hemisphere, Europe, Asia, Africa, and Australia.[1] This is to report what is believed to be the first isolation of Coxsackie virus from the Hawaiian Islands.[2]

Material for this study was obtained from a 25-month-old boy, a military dependent with herpangina, who had been living on the Islands over six months. He was first examined because of irritability, fever, and diarrhea. Physical examination was negative except for moderately inflamed tonsils without ulceration. Roentgenographic examination of the chest, and a urinalysis were normal. A diagnosis of tonsillitis was made, and the child was given 297.2 mg (300,000 units) of procaine penicillin. Later the same day the child had three generalized convulsions associated with a temperature of 104°F.

Three days later the patient had no fever and appeared well, but had severe pain upon swallowing. Examination of the throat revealed very red anterior tonsillar pillars, on the right one of which were three distinct small round ulcers measuring 2 to 3 mm in diameter. A similar ulcer appeared on the uvula. Herpangina was suspected, and stool and blood specimens were collected. The following day the child was improved, antibiotics were discontinued, and an uneventful convalescence followed.

A distilled water suspension of fecal material, collected on the fifth day of illness, was treated to destroy bacteria, and inoculated into three- or four-day- and four-week-old white mice.[3] All suckling mice developed paralysis on the second day after inoculation. The adult mice showed no evidence of illness 14 days after initial inoculation. Successive passages of material from infected leg muscle tissue in suckling mice caused paralysis and/or death.

From Tripler Army Hospital, Honolulu, T. H. Col. Rubin is now assigned to the Chemical Corps School, Fort McClellan, Ala.

Neutralization studies using sera from the patient in acute and convalescent stages of the disease and homologous virus demonstrated complete neutralization with convalescent serum but failure of neutralization with serum from the acute stage.

Histopathologic examination of tissue from paralyzed mice showed pathologic changes involving only the voluntary skeletal muscle. The pathologic reaction observed was typical of the early changes usually seen in newborn mice infected with Coxsackie group A type virus.

Virus suspensions from muscle tissue submitted for identification to the Walter Reed Army Institute of Research was typed as Coxsackie A^4 (hi-point).*

Since this primary finding, Coxsackie virus has been isolated from fecal specimens from five different military dependents in the Hawaiian Islands. Two had clinical evidence of herpangina and the remaining were family contacts. All strains, when tested in infant mice, caused paralysis and histopathologic changes conforming to those seen in Coxsackie infections.

Thus it is evident that the Hawaiian Islands can be included in what is believed to be world-wide distribution of the Coxsackie group of viruses.

REFERENCES

1. Melnick, J. L., and Curnen, E. C.: The Coxsackie group. In Rivers, T. M. (editor): *Viral and Rickettsial Infections of Man.* 2d edition. J. B. Lippincott Co., Philadelphia, Pa., 1952. pp. 338-358.

2. Territory of Hawaii Board of Health: Personal communication.

3. Beeman, E. A.; Huebner, R. J.; and Cole, R. M.: Studies of Coxsackie viruses: laboratory aspects of group A viruses. *Am. J. Hyg.* 55: 83-107, Jan. 1952.

*Identification made by Robert J. Huebner, M. D., National Institutes of Health, Bethesda, Md.

PROTEIN AND CIRRHOSIS

"The fact that protein deficiency may be an important etiological factor in cirrhosis does not imply that a high rather than a normal protein diet is necessary as treatment. In fact, most clinics now emphasize that it is far more important that the patients eat food of adequate quantity and quality than it is that a specific or peculiar diet be furnished."

—CHARLES S. DAVIDSON, M. D.
in *Journal of American Medical Association*, p. 391, Feb. 4, 1956

THE NUCLEOLI OF ATYPICAL LYMPHOCYTES IN INFECTIOUS MONONUCLEOSIS

WILLIAM W. AYRES, *Captain, MC, USN*

THE NUCLEOLI of the atypical lymphocytes of infectious mononucleosis have received scant attention in the voluminous literature on the disease. The explanation for this oversight lies in the staining technics traditionally used in preparations of peripheral blood, since the dyes involved are not selective for nucleoli. In a study of nucleoli in fresh tissue and peripheral blood previously reported,[1] a method employing azure C was found to be particularly effective. The technic and its results in a study of the nucleoli of atypical lymphocytes in 20 cases of infectious mononucleosis are described in this report.

Nucleoli of cells in fixed peripheral blood stained with Wright's stain are poorly defined as a result of over-staining of chromatin and the consequent obscuring of the nucleoli. On the other hand, a postvital staining method using azure C results in selective staining of nucleoli and cytoplasm while the chromatin of the nucleus is unstained or only poorly stained; thus the nucleoli are clearly defined. In infectious mononucleosis, the nucleoli of many of the atypical lymphocytes, as demonstrated by the azure C method, are multiple, bizarre in shape, and large. In normal blood the nucleoli of lymphocytes and monocytes, the only nucleolated cells, are small and round.

MATERIAL AND METHODS

Preparation of Slides. Slides containing a fine precipitate of azure C dye (monomethyl thionin - French) are prepared as follows: azure C dye, 0.25 gram, is dissolved in 100 ml of absolute C. P. methyl alcohol. One drop of this dye solution is placed on a slide and immediately covered with another slide. After the dye has diffused between the slides and the excess has been removed from the edges with gauze, the slides are rapidly pulled apart with a sliding horizontal motion. The alcohol evaporates, leaving a fine, even precipitate of dye on the slide. A very small drop of blood obtained from the finger is placed on a cover slip, which is then inverted over the dye-containing slide, allowing the blood to diffuse between the slide and the cover slip. The

From U. S. Naval Hospital, Yokosuka, Japan. Capt. Ayres is now assigned to the Armed Forces Institute of Pathology, Washington, D. C.

nucleoli stain in 1 to 15 minutes. The preparations are not permanent but retain their tinctorial characteristics for periods up to 2 hours. The slides are examined with the low power lens, high dry lens, and the oil immersion lens.

Certain precautions must be observed if good results are to be obtained. The slides and cover slips should be dried after immersion in equal parts of acetone and alcohol. The amount of dye left on the slides should be small—only a barely perceptible azure color should remain after the alcohol has evaporated. The amount of azure C can be controlled by pressure on the slides when the alcohol-azure C solution is between them, and by wiping the excess dye from the edges of the slides. One corner of the prepared slide should be marked on the dye-bearing surface with a wax pencil. Slides may be prepared in advance, as there is no deterioration on storage. The drop of blood should be of such size that when diffused between the slide and the cover slip it will not quite reach the edge of the latter. The cover slip may be lightly tapped to spread the blood so that it lies in a layer only one cell thick. Once placed, the cover slip should not be moved as this results in distortion of the cells.

Over-staining of the nuclei, which occurs if too much azure C is on the slide, usually accounts for failures in the employment of this method. If crystals of dye can be recognized in the complete preparation under the oil immersion lens, there is too much dye on the slide.

Clinical Material. This study is based on 20 cases of infectious mononucleosis occurring among personnel of the United States Naval Forces in the Far East. Most of the patients presented themselves with the characteristic clinical picture of fever, sore throat, lymphadenopathy, splenomegaly, lymphocytosis, and leukocytosis. In all cases the following laboratory procedures were carried out: total white blood cell counts, differential counts, total erythrocyte counts, hemoglobin determinations, azure C stains of peripheral blood, Wright's stain of peripheral blood for atypical lymphocytes, heterophil antibody determinations, presumptive Davidsohn tests, and differential Davidsohn tests.

The hematologic and serologic findings are shown in table 1. It will be noted that in all cases the presumptive titer was in the diagnostic titer range of 1:224 or over, guinea pig antigen only partially absorbed the antibody, and in only one case (case 5) did the antibody fail to be completely absorbed by sheep cells. This exception probably was attributable to the high concentration of antibody, which was 1:3584 in the presumptive test. Cases that did not meet the clinical and serologic criteria for the diagnosis of infectious mononucleosis were rejected.

The percentage of atypical lymphocytes in both Wright's stain preparations and azure C preparations was determined. One hundred lymphocytes were counted and classified as to their morphologic characteristics to determine the percentage of atypical cells.

As a control, the blood of 20 normal persons was studied by the same technics. In all of these normal cases, presumptive Davidsohn heterophil antibody tests were carried out. If the presumptive test was in titer of 1:56, a differential Davidsohn test was done. Cases in which there was any possibility of infectious mononucleosis were discarded. Also excluded were cases of such diseases as measles or infectious hepatitis, for atypical lymphocytes indistinguishable morphologically from those of infectious mononucleosis are present in smears of peripheral blood stained by the usual methods from patients with these infections.

RESULTS WITH AZURE C DYE

Atypical Lymphocytes in Infectious Mononucleosis. Atypical lymphocytes varied in number, from a few to many in the fields examined. They measured from 15 to 20 microns in diameter, depending somewhat on the pressure of the coverslip. The nucleoli of the atypical lymphocytes were large, irregular in shape, and varied in number from 1 to 10 with an average of about 5 (fig. 1). The nucleoli stained a dark azure and stood out clearly from the pale blue-staining chromatin. The nucleus was eccentrically placed, oval to round in shape, often with a small indentation on the side toward the more abundant cytoplasm. The cytoplasm was the same dark azure as the nucleoli and sometimes contained vacuoles. At the indentation of the nucleus a few red granules were seen in the cytoplasm.

Normal Lymphocytes and Monocytes. In normal peripheral blood only two types of cells contain nucleoli—lymphocytes and monocytes. The lymphocyte[1-3] measures about 7 microns in diameter and contains a single round, azure, eccentric nucleolus with a central pale area. The nucleus stains pale blue and is well demarcated from the cytoplasm and the nucleolus. The cytoplasm is dark azure, forms a thin rim around the nucleus, and may contain a few red granules. The normal lymphocyte is readily distinguished from the atypical lymphocyte of infectious mononucleosis by its small size, small amount of cytoplasm, and the single round, eccentric nucleolus containing a single round vacuole (fig. 1).

The monocyte measures from 12 to 20 microns in diameter and has from 2 to 5 very small, solid azure nucleoli, which are often difficult to see. The nucleus is oval or reniform. The cytoplasm contains fine particles of azure-colored material. The monocyte

TABLE 1. *Hematologic and serologic findings in infectious mononucleosis*

Case	Total red blood cells (/μl) (millions)	Hemoglobin (g/100 ml)	Total white blood cells (/μl)	Differential count (per cent)							Stains for atypical lymphocytes		Davidsohn test		
				Juvenile cells	Band forms	Segmented neutrophils	Lymphocytes	Monocytes	Eosinophils	Basophils	Wright's	Azure C	Presumptive	Guinea pig kidney	Beef cells
1	4.4	12.5	12,850	0	2	24	74	0	0	0	18	9	1-896	1-448	Neg.
2	3.9	11.5	10,000	0	0	33	64	3	0	0	16	5	1-896	1-224	Neg.
3	5.0	13.5	16,100	0	3	50	44	1	1	1	13	5	1-896	1-448	Neg.
4	5.0	13.5	19,050	0	2	40	51	5	1	1	55	59	1-448	1-224	Neg.
5	4.6	13.5	18,100	1	0	23	75	1	1	0	52	15	1-3584	1-1792	1-896
6	5.0	14.0	14,400	0	0	38	62	0	0	0	5	4	1-896	1-224	Neg.
7	3.76	11.5	4,300	0	0	26	60	12	2	0	15	3	1-896	1-224	Neg.
8	5.2	13.5	8,700	0	3	22	74	1	0	0	36	13	1-1792	1-448	Neg.
9	4.7	13.5	21,100	0	0	18	79	0	2	1	94	54	1-448	1-224	Neg.
10	5.2	14.0	12,150	0	4	21	75	0	0	0	80	17	1-996	1-224	Neg.

TABLE 1. *Hematologic and serologic findings in infectious mononucleosis*—Continued

Case	Total red blood cells (/μl) (millions)	Hemoglobin (g/100 ml)	Total white blood cells (/μl)	Differential count (per cent)							Stains for atypical lymphocytes		Davidsohn test		
				Juvenile cells	Band forms	Segmented neutrophils	Lymphocytes	Monocytes	Eosinophils	Basophils	Wright's	Azure C	Presumptive	Guinea pig kidney	Beef cells
11	5.0	14.0	6,950	0	5	32	61	2	0	0	80	19	1-224	1-224	Neg.
12	4.8	13.0	14,300	0	2	20	70	8	0	0	94	78	1-896	1-224	Neg.
13	4.2	12.5	9,100	0	0	15	82	2	0	1	86	84	1-896	1-448	Neg.
14	5.0	14.0	10,900	0	0	13	86	0	1	0	95	83	1-896	1-448	Neg.
15	5.0	13.0	14,000	2	2	15	79	1	1	0	90	85	1-448	1-224	Neg.
16	5.04	13.5	22,900	0	2	7	87	2	1	1	77	75	1-1792	1-448	Neg.
17	3.43	10.0	8,700	0	4	5	89	2	0	0	91	56	1-448	1-224	Neg.
18	5.5	14.0	6,950	0	0	31	61	4	4	0	53	13	1-896	1-448	Neg.
19	5.2	13.5	14,400	0	1	6	93	0	0	0	60	59	1-224	1-28	Neg.
20	5.4	13.0	19,750	0	1	17	78	2	2	0	71	57	1-224	1-112	Neg.

can be distinguished from the atypical lymphocyte by its very small round nucleoli, the absence of dark azure homogenous cytoplasm, and the presence of numerous azure-red cytoplasmic granules.

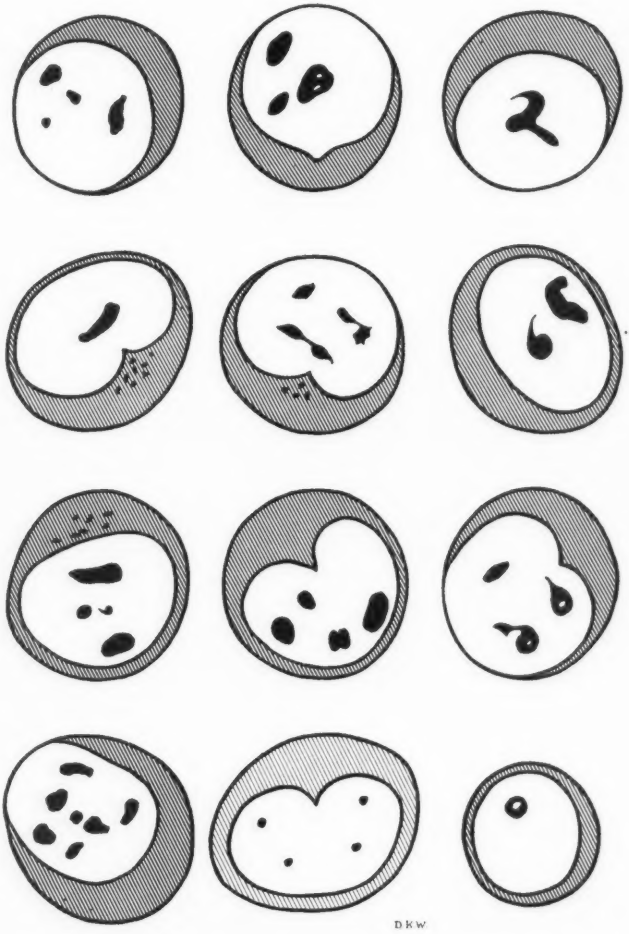


Figure 1. Diagrammatic drawing of atypical lymphocytes and a normal monocyte and lymphocyte stained by the azure C method. All cells except the two toward the right in the bottom row are atypical lymphocytes. Note the numerous large, bizarre nucleoli and basophilic cytoplasm. The middle cell in the bottom row represents a monocyte, the right-hand cell in the bottom row represents a small lymphocyte.

Guzman[2,3] has given excellent descriptions of the nucleoli of monocytes and lymphocytes as demonstrated by a technic using the same principles as the azure C technic (fig. 1).

Other Cells in Normal Blood. Cells of the granulocytic series and red blood cells in peripheral blood are not nucleolated. The neutrophils have a lobulated nucleus that tends to over-stain, and numerous fine azure granules in a clear cytoplasm. As the preparation becomes older, large red-staining cytoplasmic vacuoles may form, and fine strands, presumably of dye, precipitate in the cytoplasm. This precipitation of dye occurs rarely and then less prominently in lymphocytes and monocytes. The granules of the basophil stain an intense red with the result that this cell is readily recognized. The larger granules of the eosinophil take only a light azure tint; occasionally a few of the granules stain a dark red. The red blood cells in fresh preparations do not stain; in older preparations some of them take on a light azure tint. The reticulum of reticulocytes stains a reddish brown. The platelets show fine red granules in a light blue hyaloplasm.

Results in Infectious Mononucleosis. The results are summarized in table 1. It will be noted that atypical lymphocytes were found by both the Wright and the azure C methods. In the 20 cases studied, atypical lymphocytes averaged 59 per cent in Wright's stain preparations and 40 per cent in azure C preparations.

A lymph node was removed from one patient with atypical lymphocytosis. Material obtained by scraping the freshly cut surface of the node was emulsified in serum and stained by the azure C method. Atypical lymphocytes with the same morphologic features as those in the peripheral blood were demonstrated.

Results in Normal Persons. No abnormal lymphocytes were found in either the azure C preparations or Wright's stain preparations.

DISCUSSION

In the peripheral blood of patients with infectious mononucleosis, stained by the azure C method, the nucleoli in atypical lymphocytes are numerous, bizarre in shape, and readily differentiated from the nucleoli of monocytes and lymphocytes. Another characteristic of the atypical lymphocytes stained by this method is the intense basophilia of the cytoplasm.

In a review of the literature on infectious mononucleosis, no reports primarily concerned with the nucleoli of the atypical lymphocytes were found, although the appearance of these atypical cells in preparations with Wright's or one of the other Romanowsky stains was described by many authors. Downey and McKinlay[4] identified only an occasional atypical lymphocyte

containing 1 or 2 nucleoli—the Type III Downey cell. Downey and Stasney,[5] in their first series of 9 cases of infectious mononucleosis, reported only one case in which the lymphocytes were immature and had some nucleoli. They re-emphasized this point in 1936[6] by stating that the blood of patients with infectious mononucleosis contained only a few genuinely immature lymphoblasts with leptochromatic nuclear structure and nucleoli. They studied imprints of a biopsied lymph node from one of their cases, stained by the Giemsa-May-Grunewald technic, but found only one atypical cell with two round nucleoli. Lehndorff and Schwarz,[7] who used Romanowsky stains, described three types of cells in infectious mononucleosis: "lymphoblasts," lymphocytoid cells, and monocytoid cells. The youngest cells, or "lymphoblasts," contained several nucleoli. Limarzi, Paul, and Poncher,[8] observed that only the Type III Downey cells contain nucleoli.

A few studies of the atypical lymphocytes of infectious mononucleosis have been carried out using a supravital technic. Gall,[9] who stained supravital preparations with Janus green and neutral red, found no abnormalities in the nucleoli of the atypical lymphocytes. McLean,[10] using a similar technic, observed no nucleoli in these lymphocytes. The negative results of Gall and McLean are not surprising since the dyes they used are selective for mitochondria and cytoplasmic vacuoles, not for nucleoli or cytoplasm.

The reason for using the azure C method rather than staining fixed smears with methylene blue or its homologues is that changes occur in cells fixed by heat, methyl alcohol, or even drying that inhibit their susceptibility to any of these stains. In other words, the cells must be unfixed if a fine degree of differential staining is desired. The success of the method using unfixed tissue in wet preparations probably is due to the avidity of methylene blue and its homologue, azure C, for the ribose nucleic acid of the nucleoli and cytoplasm in preference to the desoxyribose nucleic acid of the chromatin. This is not to say that azure C and other oxidation derivatives of methylene blue will not stain chromatin in wet preparations. This they will do, if the strength of the dye is increased above that in the method herein described, or if the action of the dye on the cells is unduly prolonged. No claim is made that azure C is the only stain selective in wet preparations for ribose nucleic acid. Similar selectivity in wet preparations can be obtained, but not as well, with azure A, azure B, thionin, and even brilliant cresyl blue. This selectivity of certain dyes for nucleoli has been recognized for many years and has been used extensively for staining the nucleoli of malignant cells by MacCarty,[11,12] Quensel,[13,14] Saxen,[15] and von Haam and Alexander.[16]

As emphasized by Ludford,[17] the nucleoli of atypical lymphocytes may be expected to be large, multiple, and bizarre in shape, since cells that are actively growing and actively metabolic show these nucleolar changes.

In the diagnosis of infectious mononucleosis, the azure C method probably is of only confirmatory value. The percentage of atypical lymphocytes in fixed preparations with Wright's stain was higher than in azure C preparations. Although the nucleoli are best seen by means of the azure C technic, the changes in the cytoplasm and nucleus are demonstrated more frequently and more characteristically by Wright's stain.

CONCLUSIONS

1. The nucleoli of many atypical lymphocytes in infectious mononucleosis stained by the azure C method are large, numerous, and irregular in shape.

2. These nucleolar changes in atypical lymphocytes as demonstrated by the azure C method are of only confirmatory diagnostic value.

ACKNOWLEDGEMENTS: I wish to thank R. H. Stayberg, HM3, R. R. Burton, HM1, W. R. Volkman, HM1, H. Kumizawa, and S. Imada for suggestions and technical assistance, and Helen Knight Steward of the Armed Forces Institute of Pathology for editorial assistance.

REFERENCES

1. Ayres, W. W.: Method of staining nucleoli of cells in fresh benign and malignant tissues. *Cancer Research* 8: 352-359, Aug. 1948.

2. Guzman, G. I.: Una nueva constante leucocitaria; La imagen nucleolar linfocitica. *Rev. mex. de bol.* 5: 259-264, Jan. 1925.

3. Guzman, G. I.: El contenido nucleolar de los monocitos. *Arch. latino am. de cardiol. y hemat.* 4: 109-120, Mar.-June 1934.

4. Downey, H., and McKinlay, C. A.: Acute lymphadenosis compared with acute lymphatic leukemia. *Arch. Int. Med.* 32: 82-112, July 1923.

5. Downey, H., and Stasney, J.: Infectious mononucleosis. Part II. Hematologic studies. *J. A. M. A.* 105: 764-768, Sept. 7, 1935.

6. Downey, H., and Stasney, J.: Pathology of lymph nodes in infectious mononucleosis. *Folia haemat.* 54: 417-438, Mar. 1936.

7. Lehndorff, H., and Schwarz, E.: Das Drüsenfieber, *Ergebn. d. inn. Med. u. Kinderh.* 43: 1-113, 1932.

8. Limarzi, L. R.; Paul, J. T.; and Poncher, H. G.: Blood and bone marrow in infectious mononucleosis; review of literature and report of 25 cases. *J. Lab. & Clin. Med.* 31: 1079-1100, Oct. 1946.

9. Gall, E. A.: Diagnostic value of supravital staining in infectious mononucleosis. *Am. J. M. Sc.* 194: 546-554, Oct. 1937.

10. McLean, J. A.: Supravital staining of large mononuclear cells in infectious mononucleosis and acute leukaemias, with particular reference to their origin in the former disease. *M. J. Australia* 2: 734-740, Nov. 23, 1929.

11. MacCarty, W. C.: Value of macronucleolus in cancer problem. *Am. J. Cancer* 26: 529-532, Mar. 1936.

12. MacCarty, W. C.: Further observations on macronucleolus of cancer. *Am. J. Cancer* 31: 104-106, Sept. 1937.

13. Quensel, U.: Zur Frage der Zytodiagnostik der Ergüsse seröser Höhlen. Methodologische und pathologisch-anatomische Bemerkungen. *Acta med. Scandinav.* 68: 427-557, 1928.

14. Quensel, U.: Zytologische Untersuchungen von Ergüssen der Brust-und Bauchhöhlen, mit besonderer Berücksichtigung der karzinomatösen Exsudate. *Acta med. Scandinav.* 68: 458-501, 1928.

15. Saxen, A.: Pathologisch-anatomische und klinische Studien ueber die premaeren von der Nasenkavitaet den angrenzeden Nebenhoehlen ausgehenden Papillome und Karzinome. *Arbeit aus dem path. Inst. Univ. Helsingfors* 4: 1-130, 1926.

16. von Haam, E., and Alexander, H. G.: Cytological studies of malignant tumors. *Am. J. Clin. Path.* 6: 394-414, July 1936.

17. Ludford, R. J.: Morphology and physiology of nucleolus; nucleolus in germ-cell cycle of mollusc *Limnaea stagnalis*. *J. Roy. Micr. Soc.* pp. 113-150, June 1922.

WHAT IS EPIDEMIOLOGY?

"It is indeed clear from current usage that the definition of epidemiology has been extended far beyond its original sense as the doctrine or science of epidemics. It is certain that its scope is not limited to diseases in which epidemics are characteristic, since it is in conformity with good usage to consider the epidemiology of tuberculosis, for example. Furthermore, its scope is not limited to communicable disease because it is proper to speak of the epidemiology of cancer, of scurvy, of accidents. The extent of change in the meaning of epidemiology is borne out in the following generally accepted definition: This is a field of science which is concerned with the various factors and conditions which determine the occurrence and distribution of health, disease, defect, disability, and death among aggregations of individuals; it has application also to problems other than those of health and disease."

—E. GURNEY CLARK, M. D.
in *Journal of Chronic Diseases*
p. 595, Nov. 1955

OBTAINING A MORE ACCURATE BASAL METABOLIC RATE BY SPIROMETER

JAMES C. SYNER, *Major, MC, USA*

BEFORE the basal metabolic rate (B.M.R.) test falls into the oblivion of a rubbish heap, I consider it worthwhile to underscore a recent experience in personally performing this procedure. As my experience accumulated I became increasingly aware of how easy it was to destroy the value of the test by seemingly unimportant details. I came to recognize that this was not a "simple" test to be handled by just anyone assigned to the task. The need for close supervision of even the most conscientious technician was impressed upon me. The crowning reward was the obtaining of improved results which more closely correlated with available clinical and laboratory data.

This report will not be a review of the specifications for any pitfalls of B.M.R. testing. The subject has been covered in detail and an extensive bibliography is available; in particular, a report by Kyle[1] is recommended.

METHODOLOGY IN TRANSITIONS—DANGERS AND CONFUSIONS

The old can be as essential as documenting the new. This is especially true of reminders about abuses and incompetent handling of methodology. Methods that have been available for long periods may fall heir to many sins. Familiarity can become extremely superficial and support unrecognized degrees of carelessness. When traditional methodology is tentatively tagged for replacement by more specific, so-called scientific approaches, it may be further jeopardized by poorly motivated handling. As the pendulum swings from one extreme to the other, a vacuum can be created which is negativistic in character. Within such a transitional setting distrust of a procedure's reliability to fulfill its purpose may grow like the figures of public opinion, namely, more from rumor than from careful, objective investigation of facts.

This, to my way of thinking, is the present status of the B.M.R. as a measure of thyroid function. Newer, more specific technics

From Fitzsimons Army Hospital, Denver, Colo.

392347 O - 56 - 3

have provided increasing statistical verification of the already appreciated fact that a B.M.R. has limitations in performance, rigorous (often inconvenient) specifications for execution, and marked potential for unreliable results. With growing availability of serum protein-bound iodine (PBI) and radioactive iodine (I^{131}) uptake determinations, the limitations and pitfalls of the B.M.R. are increasingly emphasized. The popular interpretations of this data have been almost entirely unilateral, namely, as justifications for dropping the test. The implications of many comments are on the brink of a naïvete which implies that at long last a scientific test (either the I^{131} uptake or the PBI determination), which in itself is diagnostic of thyroidism, is available. The "faith" involved brings to light a kind of secret desire to have "numbers" replace the responsibility of "judgments." This opinion has waxed into such a distrust of the B.M.R. test that it is not unusual to hear physicians remark, "so what," when informed of the reading.

However, let us not forget that there is really nothing new about many of these comments on testing limitations, specifications, and error potential of the B.M.R. The majority of criticisms named are not original developments from analyses of the newer laboratory studies. There is a tremendous bibliography available on the uses, limitations, specifications, and diagnostic values of the B.M.R. in clinical practice.[1-9] The majority of these reports were documented well in advance of the contemporary "warnings" and "judgments." As early as 1932, Peters and Van Slyke[2] implied the limitations and specifications for optimum test performance. They indicated that the test is an indirect and nonspecific study, and reflects thyroid activity only as the hormone influences heat production and, consequently, oxygen consumption. It is not the function of this report to review this literature. However, it is considered pertinent to mention recent reports which discuss the place of B.M.R. testing in present-day study and management of thyroidism.

PROS AND CONS OF THE SITUATION

That there is still an important and valuable place for the B.M.R. determination in the diagnosis and management of thyroidism is suggested by recent reports.[10-14] The review article by Chapman and Maloof,[10] based on their experience in handling hyperthyroidism over a 10-year period substantiated this viewpoint. These authors concluded that accurate diagnosis and management is obtained only when several tests are utilized to evaluate thyroid function. No single test can be securely accepted as an absolute criterion of a specific disease state. To base a definitive diagnosis on any single test invites error. They point out the numerous factors which can effect each of the three most utilized indexes of thyroid function (I^{131} uptake, PBI level,

and B.M.R. measurement). Obviously these factors limit the specificity and sensitivity of the test. In the important aspect of post-I^{131} treatment follow-up and management of hyperthyroidism, their work shows that in 84 per cent of 131 patients there was a close correlation between the I^{131} uptake, the PBI level, B.M.R., and the clinical evaluation of the patient. Therefore, when properly processed, B.M.R. determinations can serve as a reliable index of thyroid response to I^{131} treatment.

Kyle[11] presented an excellent review of the problems involved in the measurement of metabolism. He stated that although the B.M.R. is inferior to other technics it can provide valuable assistance in quantitating the degree of hyperthyroidism and in following response to various therapeutic measures. This review emphasizes the need for following each specification in test performance, and an awareness of the many technical factors which can produce grossly abnormal results. Kyle's review certainly crystallizes the fact that this is not a "simplified" procedure which can be easily and adequately handled by any individual so designated regardless of motivation or level of training.

Bhattacharya et al.[12] concluded from their experience that a reliable diagnosis of thyroid function cannot be consistently arrived at from any one test alone. To arrive at the most reliable diagnosis one must carry out several tests simultaneously and perform careful history, physical examination, and clinical observations. It is interesting to review their test results and note the wide range of values for normal and hyperthyroid patients (table 1). These data verify the limitations of specificity and sensitivity, and indicate the overlap between euthyroidism and disease states for all the popular indexes.

TABLE 1. *Results of tests in euthyroid and hyperthyroid patients (From Bhattacharya and associates[12])*

Type of patient	Tests		
	B.M.R. (percent)	PBI (μg/100 ml)	I^{131} uptake (percent)
Euthyroid	−15 to +23.6	4.2 to 9.8	15 to 55
Hyperthyroid	+16 to +84	8.2 to 26.7	39 to 88

Zieve, Skanse, and Schultz[13] undertook a study of the comparative value of the B.M.R., I^{131} uptake, and PBI level in the diagnosis of borderline hyperthyroidism. They found that the I^{131} was the most effective test for differentiating the borderline hyperthyroid from the euthyroid patient. The serum PBI level was approximately four fifths as effective and the B.M.R., one fifth as effective. Their data also documented the wide range

of values and overlapping characteristic of each test for normal and hyperthyroid patients (table 2).

Beierwaltes[14] concluded from his experience with thyrotoxicosis that a diagnosis can be made in most cases by adequate medical history, physical examination, B.M.R., and serum cholesterol. He believed that the optimum use of the I^{131} and PBI is in the diagnosis of certain problem cases. In regard to interpretations of the I^{131} and PBI, he cautioned that unwise actions can result unless it is fully realized that these studies do not measure the degree of clinical sickness called thyrotoxicosis. It was his opinion the PBI determination is so difficult to perform with consistent accuracy that its use is largely restricted to university laboratories.

TABLE 2. *Results of tests in euthyroid and hyperthyroid patients (From Zieve, Skanse, and Schultz[18])*

Type of patient	Tests		
	B.M.R. (percent)	PBI (μg/100 ml)	I^{131} uptake (percent)
Euthyroid	−16 to +49	3.1 to 11.7	43 to 87
Hyperthyroid	−6 to +63	4.7 to 17.9	8 to 64

Duffy and associates[15] reviewed their results in thyroid function testing and concluded that the time, personnel, and facilities involved in doing B.M.R. determinations would be better expended in the more objective and reliable tests, namely, I^{131} and PBI. Although no attempt is made to discuss their conclusion, I believe it pertinent to point out the data from one scattergram documented in their report. Table 3 gives comparative results for B.M.R. and I^{131} in 48 euthyroid patients. The percentage of patients who had results in a hypothyroid range was identical for both methods. The B.M.R. produced its poorest correlation, and supposedly its greatest index of unreliability, with the I^{131} uptake on the steep or "excitement" side of the oxygen uptake curve. In my personal experience this is the kind of oxygen uptake response most likely to be influenced by the testing environment and subjective state. I believe that careful attention to the circumstances of the test should result in elimination of many errors producing this kind of oxygen uptake slope. This kind of error in testing should be available to a high degree of control. Of further importance when a high oxygen uptake curve is obtained in the patient regarded as euthyroid is a revaluation of the differential diagnosis. Silver, Poroto, and Crohn[16] reported a number of diseases which produced increase of the B.M.R. without the clinical picture of diffuse toxic goiter. The mechan-

ism of hypermetabolism in such patients is not clear in all instances. It is suspected that oversight of this fact may contribute to the number of high B.M.R. results obtained in euthyroid patients.

TABLE 3. *Comparison of I^{131} uptake and B.M.R. in 48 euthyroid patients*
(Adapted from scattergram compiled by Duffy and associates[15])

I^{131} uptake		B.M.R.	
Percent of cases above 45%	8.3	Percent of cases above +15	28
Percent of cases below 10%	8.3	Percent of cases below −15	8.3

ABUSES, OVERSIGHTS, AND ERRORS

The following factors represent delinquencies which significantly influenced the test result. They occurred with significant frequency. The majority represented routine practices in the daily operation of the test.

The Test Environment. The requirement for a quiet, standardized, nonstimulating environment is unequivocal. During my experience I came across the repetition of many kinds and intensities of abuses. The open-ward situation was almost always entirely unsuited for a reliable test. Motor-driven floor cleaners, glaring lights, rattling window shades, juggling food carts, vociferous patients and staff personnel, and inspection preparations were but a few of the difficulties. The importance of all this was that almost always the physician applying results to a clinical problem was unaware of the situation. An illustrative case in point was a 24-year-old man tested on an open ward which housed some 40 patients. The test was performed while patients conversed and argued in loud voices, breakfast tray pick-up went on, and a floor polisher was operated. This test gave a B.M.R. of +32. Repeat study in a quiet room without lights gave a +11. Whereas the +32 was a reading confusing to the problem, the repeat study clarified the situation and was consistent with the clinical picture and other laboratory data. The test was not at fault, but rather our abuse of its specifications. It may well be a legitimate criticism of "inconvenience" that specifications are rigorous, but it cannot be classified as "fault."

Accurate Data on Age, Weight, and Height. This source of error was most surprising and originally pointed out by the patient's physician. Once there was an awareness of its presence, future checks uncovered its repetition. It had been customary for ward and technical personnel to make a bedside survey of this data

if not previously recorded by actual measurement. When asked for physical measurements, the patient would estimate to the best of his recollection or judgment. An illustrative case involved a young man who underestimated weight and height sufficiently to produce a result of -28. When he was weighed and measured accurately, his result was -11. The initial result would have confused the picture and entered the statistical column as another "error" charged to the test. In reality it represented an abuse of well-defined test specifications.

The Equipment. Despite the obvious nature of this essential, its minor and major breakdowns were frequently overlooked. The case selected illustrates but one detail in faulty equipment. I have chosen this particular experience in order to emphasize how meticulous one's awareness of equipment failure must be. A young woman was tested, and a result of +44 reported. This was entirely inconsistent with the clinical appraisal and related studies of thyroid function. Inspection of the respiratory tracing revealed a pattern consistent with air leak. In review of possible sources it was noted that the sponge-rubber nose clip was markedly worn. Its condition was such that airtight fit was unpredictable. When a piece of stainless metal was held under the patient's nose, moisture condensation indicative of air leak appeared. Retest with a good nosepiece gave a result of -3, which was considered satisfactory. Other equipment failures included faulty mouthpieces (both leaks in the rubber and improper fittings), failure of carbon dioxide absorbent to keep up with expired air content, leaky joints, poor writing stylus, and faulty tubing. The point in emphasis is that in order to be found the faults had to be searched for.

Analysis of the Respiratory Tracing. The slope of the respiratory tracing represents the oxygen uptake. The usual practice is to draw a straight line by connecting representative points of the expiratory end phase of tidal exchange. This usually involves ignoring minor irregularities in the expiratory end position. Judgment is involved in selecting the most accurate and representative line for the oxygen uptake curve. Responsibility for this judgment rests with a technician since almost never in our situation did the physician review or evaluate the respiratory tracing. The case in point illustrates how marked an error can result from faulty judgment. Based upon the technician's judgment in negotiating an oxygen uptake slope, the B.M.R. result was +57. Review of the result with clinical picture and associated laboratory data emphasized how erroneous the result was. This patient had had a thyroid nodule removed which was shown to be malignant. Further treatment, including radioactive iodine, resulted in a clinical state of hypothyroidism. Review indicated that the early section of the respiratory tracing was highly irregular, con-

sistent with poor patient adjustment and, possibly, an air leak. By the fourth minute, the patient's state became steady. Analysis of this section gave a B.M.R. result of −24 which correlated with associated data. Proper analysis of the respiratory tracing can provide other clues. Factors such as air leaks, lagging carbon dioxide absorption, respiratory neurosis, anxiety, and certain varieties of pulmonary insufficiency can be suspected from patterns. The importance of calculating the ventilation equivalent of oxygen as related to thyroidism has been previously discussed.[17]

B.M.R. TESTING IN GENERAL PRACTICE

Practicing medicine in an oasis of trained specialists and scientific facilities is a rich experience. However, it can result in losing sight of the needs and expediencies of medical practice at the private office level. The effectiveness with which the private physician utilizes conventional tools in meeting his responsibilities is all too frequently overlooked. To illustrate this circumstance I consider that it is worthwhile to recall a previous case report.[18] The patient had been discharged from a large general hospital as undiagnosed after a long hospitalization. She had been intensively evaluated by many specialists and laboratory procedures on both medical and psychiatric services. Her complaints and findings were those of extreme emotional lability, psychotic episodes, and choreiform movements. Continuation of symptoms after hospital discharge brought her to a local physician who strongly suspected hyperthyroidism. An office B.M.R. was obtained, and a reading of +86 recorded. She was started on propylthiouracil. At the end of two months her B.M.R. was +7. She was cheerful, socialized well with her friends, and her pulse rate dropped to 76 per minute. The differential value of the test is obvious, and its value in treatment follow-up excellent.

SUMMARY

Practices which can provide a more accurate B.M.R are discussed. It is suggested that poor motivation, careless handling of the procedure and abuse of its specifications contribute significantly to the statistical count of "erroneous" results.

Although our advances in methodology are providing increasing refinement in specificity and sensitivity, at this time no single test is absolutely diagnostic of thyroidism. The use of several tests are recommended as indexes of thyroid function. Several recent reviews present convincing evidence that there is still a valuable place for B.M.R. testing in the management of thyroidism.

REFERENCES

1. Kyle, L. H.: Symposium on current concepts of pathogenesis and treatment; clinical application of the basal metabolism test. *M. Clin. North America* 34: 1839-1851, Nov. 1950.

2. Peters, J. P., and Van Slyke, D. D.: *Qualitative Clinical Chemistry.* Williams & Wilkins Co., Baltimore, Md., 1932. pp. 193-216.

3. DuBois, E. F.: *Basal Metabolism in Health and Disease.* 3d edition. Lea & Febiger, Philadelphia, Pa., 1936.

4. Boothyby, W. M.; Berkson, J.; and Plummer, W. A.: Variability of basal metabolism; some observations concerning its application in health and disease. *Tr. Am. A. Study Goiter.* pp. 143-151, 1937; also *Am. Int. Med.* 11: 1014-1023, Dec. 1937.

5. Roth, P., and Roth, H. P.: Metabolism: apparatus and methods. In Glasser, O. (editor): *Medical Physics.* Year Book Publishers, Inc., Chicago, Ill., 1944. pp. 718-724.

6. Lex, J. K., and Parker, G. M.: Technical, mechanical, and interpretative aspects of basal metabolism. *Am. J. Clin. Path.* Tech. Supp. 3: 91-118, May 1939.

7. Cederquist, D.: Effect of operator on variability of basal metabolism data. *J. Lab. & Clin. Med.* 27: 1328-1329, July 1942.

8. Roth, P., and Buckingham, P. E.: Criteria of dependable basal metabolic report. *Am. J. Clin. Path.* 9: 79-92, Jan. 1939.

9. Barman, J. M., and Porcile, E.: Simple method of assuring accuracy in determination of oxygen consumption by Benedict-Roth apparatus. *J. Lab. & Clin. Med.* 31: 1254-1256, Nov. 1946.

10. Chapman, E. M., and Maloof, F.: Use of radioactive iodine in diagnosis and treatment of hyperthyroidism: 10 years' experience. *Medicine* 34: 261-321, Sept. 1955.

11. Kyle, L. H.: Measurement of metabolism. *Therapeutic Notes* (Parke, Davis & Co.) 62: 254-256, Oct. 1955.

12. Bhattacharya, K. L.; Chakraborty, K. P.; Bose, A.; and Das Gupta, N. N.: Corelation of B.M.R., P.B.I., and radioiodine uptake in assessment of thyroid function. *J. Indian M. A.* 24: 1-4, Oct. 1, 1954.

13. Zieve, L.; Skanse, B.; and Schultz, A. L.: Comparative value of basal metabolic rate, chemical protein-bound iodine, and radioactive iodine excretion or uptake in diagnosis of borderline hyperthyroidism when used individually or in combination. *J. Lab. & Clin. Med.* 45: 281-285, Feb. 1955.

14. Beierwaltes, W. H.: Value of radioactive iodine uptake and protein-bound iodine estimations in diagnosis of thyrotoxicosis. *Am. Int. Med.* 44: 40-51, Jan. 1956.

15. Duffy, H. J., Jr.; Wheeler, T. E.; Novak, P. J.; and Edwards, N.: Comparison of thyroid function tests. *U. S. Armed Forces M. J.* 5: 995-999, July 1954.

16. Silver, S.; Poroto, P.; and Crohn, E. B.: Hypermetabolic states without hyperthyroidism (nonthyrogenous hypermetabolism). *Arch. Int. Med.* 85: 479-482, Mar. 1950.

17. Syner, J. C.: Ventilation and oxygen absorption in thyroidism; analysis of respiratory tracings. *U. S. Armed Forces M. J.* 5: 498-503, Apr. 1954.

18. Syner, J. C.; Fancher, P. S.; and Kemble, J. W.: Chorea associated with hyperthyroidism. *U. S. Armed Forces M. J.* 5: 61-67, Jan. 1954.

"The cost of training a physician is $10,000 to $12,000, and the student pays only $2,532 [on the average] during his four-year training."

—*Newsletter* of the Massachusetts Medical Society, Mar. 21, 1956

METABOLIC DISEASES AND URINARY CALCULI

RICHARD P. SPENCER, *Lieutenant, MC, USNR*

BY THE USE of technics presently available, most instances of urinary lithiasis cannot be related etiologically to a metabolic derangement. A small but very real percentage of such calculi are, however, a reflection of a disorder of intermediary metabolism. From the standpoints of immediate therapy and ultimate prognosis, it is therefore incumbent upon the physician to investigate the nature of the calculus and the possibility of a more fundamental underlying disease. The present report discusses several metabolic disorders associated with urinary lithiasis and outlines the general scheme for their investigation.

URIC ACID CALCULI

There are two pathologic conditions that are associated with a high incidence of uric acid calculi (and with hyperuricemia).

Gout. Kittredge and Downs[1] found that over a nine-year period, 1.23 per cent of all patients admitted to the Ochsner Clinic had a history of urinary calculi; during the same interval, 14 per cent of 324 patients with gout gave such a history. The prevalence of urinary stones in gouty individuals was thus over 10 times that of the general clinic population. Renal damage in this condition has been ascribed to two factors, both resulting from uric acid precipitation: (1) deposition of crystals in renal tubules, (2) production of calculi with secondary obstruction and infection. Recognition of gout in an individual affected with calculi is therefore of importance, as control of the basic disease may retard further uric acid precipitation and obviate continued formation of concretions.

Leukemia. Infiltration of the kidney by neoplastic cells is frequent in the leukemic process. However, renal impairment in such a disease may stem from another source, namely, the deposition of uric acid calculi.[2] The turnover of cellular substances in the leukemic individual is apparently of such magnitude as to result in an increased outpouring of uric acid (the end point of purine metabolism in man). In addition, there may be an exacerbation of calculus formation during the treatment of leukemia by means of

From U. S. Naval Hospital, Newport, R. I. Lt. Spencer is now assigned to the U. S. S. *Perry* (DD 844), FPO, New York, N. Y.

either irradiation[3] or nitrogen mustards[4] (presumably related to the liberation of purines from cells injured by the cytotoxic action of the therapeutic agent).

CALCIUM CALCULI

The major portion of calcium excreted by the body is normally carried via the fecal stream. In hyperparathyroidism the quantity of calcium handled by the renal apparatus is increased both relatively and absolutely. Renal calculi composed of calcium are often found in cases of hyperparathyroidism, and this may be the presenting complaint. Indeed, damage to the kidneys is common in this entity.[5] A careful medical evaluation of the clinical situation and blood chemistry values is necessary, as part of the picture may be simulated by the milk-alkali syndrome of Burnett and associates[6] (in which hypercalcemia occurs without hypercalciuria). It must also be stressed that immobilization per se is followed by halisteresis and an increased incidence of calcium calculi[7] (and the transient hypercalcemia of recumbency may be aggravated by hypervitaminosis D).

CALCIUM OXALATE CALCULI

Calcium oxalate forms a portion of many urinary concretions. Stones of this composition are also found in the infrequently described condition termed "oxalosis." Probably representing a specific defect of oxalic acid metabolism, oxalosis is characterized by the precipitation of the calcium salt of oxalic acid in extraosseous locations. The syndrome is marked by the urinary excretion of calcium oxalate crystals, as well as resultant nephrolithiasis, nephrocalcinosis, renal failure, osteoporosis, and clusters of calcium oxalate crystals in various organs (including bone marrow). The diagnosis is established by identifying the crystals, finding an elevated 24-hour excretion of calcium oxalate, and possibly by aspirating typical crystals from one or more sites. Roentgenograms may reveal calculi with radiating spicules, considered characteristic of calcium oxalate.[8]

XANTHINE CALCULI

Pure urinary xanthine stones have been identified several times, and there are approximately two dozen case reports in the literature. Dent and Philpot[9] described the only known metabolic study in an affected individual. These authors found that a 4½-year-old girl who passed a zanthine stone also excreted large quantities of zanthine in her urine, but almost no uric acid. The patient's serum uric acid level was also depressed (0.5 mg per 100 ml). Since uric acid is produced from xanthine (facilitated by the exzyme xanthinoxidase), one may speculate that either: (1) there was an error at the xanthinoxidase level, with diminished production of uric acid from xanthine, or (2) there was excessive clear-

ance of xanthine from plasma (error at the renal level) with quantities in the blood stream insufficient to be converted to uric acid (technics for measuring blood xanthine concentrations are not yet available).

Chemical identification of the calculus is sufficient to make the diagnosis. An individual may have xanthinuria, however, as shown by a urinary chromatogram, with no symptoms between bouts of renal colic.

HOMOGENTISIC ACID CALCULI

Homogentisic acid is excreted in the urine of individuals affected with alkaptonuria; it is not found in normal urine specimens. The error of metabolism results from the absence of the homogentisic acid oxidative enzyme (which normally splits the compound, a metabolite of the amino acid tyrosine to fumarylacetoacetic acid). The alkaptonuric patient may be entirely asymptomatic or may show evidence of ochronosis (due to the deposition of derived pigments in cartilaginous and tendinous structures, with resultant pigmentation and arthritis). Alkaptonuric patients can show calculi in their bladders,[10] urethras, or prostate glands.[11] The stones are generally multiple, brown or black, and may be calcified. Identification of homogentisic acid in the urine establishes the diagnosis of alkaptonuria (although, of course, these individuals and the others discussed here may have urinary calculi unrelated to their basic disease).

CYSTINE CALCULI

What was formerly termed "cystinuria" has been shown to be an inhomogeneous entity. The condition referred to as cystinuria consists of the urinary excretion of cystine, lysine, and arginine, possibly due to an error of the renal reabsorptive mechanism.[12] Such individuals are generally asymptomatic until they form calculi, but excretion of the three amino acids continues at all times.

Distinct from cystinuria are two conditions associated with a generalized amino aciduria: (1) Fanconi syndrome.[13] In addition to the amino aciduria, there occurs a urinary loss of electrolytes and glucose, the so called "amine diabetes." (2) Cystinosis.[14] Amino aciduria is associated with the deposition of cystine crystals at many sites, including cornea, bone marrow, and kidney, with renal damage.

Cystinuria can thus be distinguished from the latter entities by means of a urinary chromatogram. Cystinuria reveals the cystine-lysine-arginine pattern, while the other syndromes show a generalized amino aciduria, in addition to their individual defects.

METHODS OF STUDY

Detection of a possible metabolic cause of a urinary calculus depends upon a twofold approach: (1) determination of the nature of the stone, and (2) study of the patient.

An individual suspected of having a urinary calculus should have his urine strained. Examination of the concretion, macroscopic and microscopic, may provide information as to its chemical nature (table 1). Care must be exercised not to overlook the urine proper, for small fragments may pass through the screening material, and the urine itself often contains quantities of the material which formed the calculus (table 2).

In addition to visual examination of the gravel, chemical tests may be employed, but because of inadequacies of chemical studies,[15] the procedures listed in table 3 should be considered only presumptive. Identification is accomplished by means of more detailed chemical study (including chromatographic, electrophoretic, and microchemical methods[16]), and physical and optical methods[15] (urinary calculi, being crystals, are amenable to optical study, as are other minerals).

Evaluation of the individual should include a dietary history (to rule out hypovitaminosis A, which may exacerbate the tendency to form calculi, and to consider the possibility of the milk-alkali syndrome), and a family history (to determine if siblings or other relatives are also suffering from urinary stones).

Approximately 9 out of 10 urinary calculi are radiopaque;[17] stones considered here which are nonopaque are those composed of pure uric acid, and pure xanthine (although, of course, detection ultimately depends upon the size of the calculus and overlying gas shadows). A roentgenogram of the abdomen may therefore be of assistance. Finally, other appropriate studies should be carried out as indicated (such as urinary Sulkowitch test, serum determinations of calcium, phosphorus and alkaline phosphatase, and roentgenograms of the long bones and lamina dura area in suspected hyperparathyroidism; blood uric acid determinations in suspected uric acid or xanthine calculi; plasma electrolyte studies, urine chromatography, and examination for systemic cystine crystals in any of the spectrum of "cystinurias").

In reviewing a number of clinical records of cases of urinary concretions, there appeared to be a lack of attention paid to the nature of the calculus, once passed. Study of the calculus may reveal valuable information as to whether a more basic disease is involved. Two cases may serve to illustrate this point.

TABLE 1. *Chemical structure and appearance of various calculi*

Type of calculi	Chemical structure	Appearance
Uric acid		Pure stones are often round and smooth; generally hard, ellipsoid or spherical, may be laminated, golden-yellow.[18]
Calcium	Ca	Depends on substance with which combined. White or discolored, hard.
Calcium oxalate	$Ca(COO)_2$	Hard; brown, sepia, or gray; may have spinous appearance; mulberry calculi have nipple-like projections.[16] Crystals birefringent, occurring in sheaves of long needles and broken plates.[19]
Xanthine		Reddish brown, compact, hard, laminated, can be polished to a waxy luster.[18]
Homogentisic acid		Usually multiple, brown to black, may be calcified.
Cystine		Generally crystalline, smooth, polished, green or yellow brown; may be mixed with phosphates, giving rough and granulated appearance.[18] Crystals almost colorless hexagons with unequal sides.

TABLE 2. *Urinary excretion of calculus-forming compounds*

Compound	Normal	Abnormal
Uric acid	Partially depends upon intake.[20]	Higher in 25% of gouty patients than in general population.[20]
Calcium	Equal to intake minus fecal loss in homeostatic adult; normally 10-30% intake in urine.[21]	Over 110 mg/day on 110 mg intake in hyperparathyroidism.[21]
Calcium oxalate	Approximately 22 mg/day in adult (free and combined acid).[22]	95 to 182 mg/day free and combined (65 to 122 mg/day of free acid) in case of oxalosis.[22] 200 and 180 mg/day total in two cases of oxalosis.[26]
Xanthine	14 mg/12 hours in one adult.[23]	176 mg/day or 607 mg/g of creatinine, in xanthinuria.[9]
Homogentisic acid	None.[24]	Up to gram quantities in alkaptonuria.[24]
Cystine	40 to 80 mg/day in adult.[25]	0.5 to 1.0 gm/day in cystinuria.[25]

TABLE 3. *Presumptive chemical tests for identification of urinary calculi*

Types of calculi	Test
Uric acid	Murexide test: evaporation of material with a few drops of concentrated nitric acid yields red color which turns purple on addition of ammonium or potassium hydroxide.[27]
Calcium	Urine proper contains increased calcium in hyperparathyroidism, which may be shown by Sulkowitch's reagent (buffered oxalate precipitates calcium producing a turbid suspension, read as zero to four plus).[28]
Calcium oxalate	Urine Sulkowitch reaction normal. Crystals do not dissolve in dilute acetic acid, saturated ammonia, or 60 per cent sodium hydroxide; dissolve in hydrochloric acid.[19] After clearing urine of protein and sediment by heat, acetic acid, and centrifugation, oxalate radical can be shown by adding one ml of 5% $CaCl_2$ to 2 ml of urine, followed by two drops of 5% acetic acid, and observing turbidity.[29]
Xanthine	Murexide test produces yellow color, purple on alkalinization.[27]
Homogentisic acid	Urine proper turns brown on alkalinization. Urine will reduce Benedict's reagent, and will turn transient blue color on dropwise addition of ferric chloride.[24]
Cystine	Heating calculus or concentrated urine produces hydrogen sulfide with characteristic odor and ability to darken lead acetate paper.

CASE REPORTS

Case 1. Nineteen hours after an episode of pain in the left groin, a 27-year-old man passed a small, hard stone at the end of micturition. He was reassured by his physician, given the pellet as a "souvenir," and returned to his activities. Four months later colicky pain was experienced on the right side, and he entered the hospital.

Urinalysis revealed only a few red blood cells. A roentgenogram of the abdomen was interpreted as showing no stones, and the patient was to be discharged. The attending physician noted, however, that the report of the roentgenographic findings included a statement as to the "demineralization of visible osseous structures." Blood studies indicated elevated values of calcium and alkaline phosphatase and a reduced phosphorus level.

Exploration of the patient's neck, at another hospital, revealed a parathyroid adenoma. As an afterthought, analysis of the "souvenir" stone indicated that it was composed of almost pure calcium. By careful study of the stone, attention could have been directed to the diagnosis four months earlier.

Case 2. A 32-year-old man entered the hospital because of "shooting" right flank pain, which came on suddenly at night. Because of the severity of the attack, morphine was administered by the physician

called to see him. On admission, the patient's past history and physical examination were within normal limits. A centrifuged urine specimen was reported as showing microscopic hematuria, but successive urine specimens were not filtered to recover possible calculi. A roentgenogram of the abdomen and an intravenous pyelogram were both unrevealing. The possibility of a disorder of calcium metabolism was considered and appropriate blood studies ordered; these were within the normal range. Seven months after discharge from the hospital, a second bout of right flank pain was experienced. Calcium studies were again normal. However, careful straining of the urine was rewarded by the recovery of numerous cystine crystals. The patient was a cystinuric who had remained asymptomatic until his first bout of renal calculus. The elimination of one metabolic disease (hyperparathyroidism) from the differential diagnosis does not reduce the necessity of looking for other causes of the calculi.

SUMMARY

The diagnosis of urinary lithiasis does not end the physician's diagnostic responsibility. It is incumbent upon him to determine if a metabolic disease has contributed to the formation of the stone.

Calculi (uric acid, calcium, calcium oxalate, xanthine, homogentisic acid, cystine) that may be due to a fundamental metabolic disorder was discussed. Technics of investigation of the nature of the calculus and of the underlying defect are outlined.

A high index of suspicion, plus a systematic investigation by means of a specific history, urine straining, examination of the calculus, roentgenogram of the abdomen, and appropriate blood studies, may be rewarded by the uncovering of a metabolic defect.

REFERENCES

1. Kittredge, W. E., and Downs, R.: Role of gout in formation of urinary calculi. *J. Urol.* 67: 841-849, June 1952.

2. Merrill, D., and Jackson, H., Jr.: Renal complications of leukemia. *New England J. Med.* 228: 271-276, Mar. 4, 1943.

3. Lear, H., and Oppenheimer, G. D.: Anuria following radiation therapy in leukemia. *J. A. M. A.* 143: 806-807, July 1, 1950.

4. Richmond, G. H., and Beardsley, G. D.: Nitrogen mustard therapy complicated by acute renal failure due to uric acid crystallization. *Am. Int. Med.* 39: 1327-1332, Dec. 1953.

5. Morgan, A. D., and Maclagan, N. F.: Renal disease in hyperparathyroidism. *Am. J. Path.* 30: 1141-1167, Nov.-Dec. 1954.

6. Burnett, C. H.; Commons, R. R.; Albright, F.; and Howard, J. E.: Hypercalcemia without hypercalcuria or hypophosphatemia, calcinosis, and renal insufficiency. *New England J. Med.* 240: 787-794, May 19, 1949. Cited in Kyle, L. H.: Differentiation of hyperparathyroidism and milk-alkali (Burnett) syndrome. *New England J. Med.* 251: 1035-1040, Dec. 23, 1954.

7. Kimbrough, J. C.; Denslow, J. C.; and Worgan, D. K.: Urinary tract calculi in recumbent patients. *J. A. M. A.* 142: 787-789, Mar. 18, 1950.

8. Albright, F., and Reifenstein, E. C., Jr.: *The Parathyroid Glands and Metabolic Bone Disease.* The Williams & Wilkins Co., Baltimore, Md., 1948. p. 64.

9. Dent, C. E., and Philpot, G. R.: Xanthinuria; inborn error (or deviation) of metabolism. *Lancet* 1: 182-185, Jan. 23, 1954.

10. Young, H. H.: Calculi of prostate associated with ochronosis and alkaptonuria. *J. Urol.* 51: 48-58, Jan. 1944.

11. Martin, W. J.; Underdahl, L. O.; and Mathieson, D. R.: Alkaptonuria; report of 3 cases. *Proc. Staff. Meet., Mayo Clin.* 27: 193-200, May 7, 1952.

12. Dent, C. E.: Applications to study of amino-acid and protein metabolism. In Williams, R. T., and Synge, R. L. (editors): *Partition Chromatography.* Biochem. Soc. Symp. 3, Cambridge University Press, London, 1949. pp. 34-51.

13. Fanconi, G.: Weitere Beitrage zur Cystinkrankheit (der Amindiabetes). *Helvet. paediat. acta* 1: 183-205, Feb. 1946.

14. Brown, R. J. K.: Clinicopathologic study of cystinosis in 2 siblings. *Arch. Dis. Childhood* 27: 428-433, Oct. 1952.

15. Prien, E. L., and Frondel, C.: Studies in urolithiasis; composition of urinary calculi. *J. Urol.* 57: 949-994, June 1947.

16. Holt, P. F., and Tamoky, A. L.: Analysis of calculi using microchemical methods. *J. Clin. Path.* 6: 114-117, May 1953.

17. Higgins, C. C.: Nonopaque urinary tract calculi. *J. Urol.* 70: 857-863, Dec. 1953.

18. Lowsley, O. S., and Kirwin, T. J.: *Clinical Urology.* 2d edition. The Williams & Wilkins Co., Baltimore, Md., 1944. Vol. 2. pp. 1594-1596.

19. Dunn, H. G.: Oxalosis; report of case with review of literature. *A. M. A. Am. J. Dis. Child.* 90: 58-80, July 1955.

20. Gutman, A. B., and Yü, T. F.: Current principles in management of gout. *Am. J. Med.* 13: 744-759, Dec. 1952.

21. Canatrow, A., and Trumper, M.: *Clinical Biochemistry.* 4th edition. W. B. Saunders Co., Philadelphia, Pa., 1950. p. 185.

22. Newns, G. H., and Black, J. A.: Case of calcium oxalate nephrocalcinosis. *Great Ormond St. J.* 5: 40-44, June 1953.

23. Williams, J. N., Jr.: Micromethod for determination of xanthine and guanine in urine. *J. Biol. Chem.* 184: 627-632, June 1950.

24. Rapoport, M.: Defective amino acid metabolism; errors of phenylalanine and tyrosine metabolism. In Nelson, W. E. (editor): *Textbook of Pediatrics.* 6th edition. W. B. Saunders Co., Philadelphia, Pa., 1954. pp. 218-219.

25. Walshe, J. M., and Senior, B.: Disturbances of cystine metabolism in liver disease. *J. Clin. Invest.* 34: 302-310, Feb. 1955.

26. Aponte, G. E., and Fetter, T. R.: Familial idiopathic oxalate nephrocalcinosis. *Am. J. Clin. Path.* 24: 1363-1373, Dec. 1954.

27. Everett, M. R.: *Medical Biochemistry.* 2d edition. Paul B. Hoeber, Inc., New York, N. Y., 1948. p. 509.

28. Todd, J. C., and Sanford, A. H.: *Clinical Diagnosis by Laboratory Methods.* 10th edition. W. B. Saunders Co., Philadelphia, Pa., 1943. p. 132.

29. Domanski, T. J.: Experimental urolithiasis; calcium oxalate stone. *Am. J. Clin. Path.* 20: 707-715, Aug. 1950.

The only equipment lack in the modern hospital? Somebody to meet you at the entrance with a handshake!

—Martin T. Fischer

392347 O - 56 - 4

TUMORS OF THE TESTIS

CLAUDE C. DODSON, *Colonel, MC, USA*
JOHN A. ISHERWOOD, *Colonel, MC, USA*

THE PURPOSE of this article is to present the treatment of tumors of the testis as utilized by the authors, as well as to present a report of cases at this hospital. The cause of tumors of the testis is unknown. Although many writers have tried to associate them with trauma and have postulated other causes and while trauma may be the cause for their more rapid metastasis, we believe that it is not associated with the origin. In military medicine, most of the patients with this condition are seen in the 25- to 34-year age group. Most deaths occur within two years of the initial diagnosis.

CLASSIFICATIONS

For the purpose of discussion, we may divide primary malignant testicular growths into germinal and nongerminal cells. Those that develop in the totipotent germ cell compose 95 per cent, and those that develop from the nongerminal cells of Sertoli, interstitial, and stroma cells compose approximately 5 per cent. Melicow[1] classified germinal tumors based on the postulates that (1) seminoma is a tumor in which the germ cells have retained their intranuclear trigerminal potential and (2) embryonal carcinoma, teratocarcinoma, and adult teratoma are a family of tumors in which the germ cells have released the intranuclear trigerminal potential. Mixed germinal tumors are not uncommon and therefore we believe that these postulates help to explain the occasional discrepancies between the type of the primary tumor and its metastasis.

We believe that the classification as given by Melicow is too detailed to be of value as a treatment index and have preferred the classification of Friedman and Moore.[2] They grouped the tumors into the four fundamental structural patterns of (1) seminoma; (2) embryonal carcinoma, including chorioepithelioma; (3) teratocarcinoma; and (4) teratoma, plus interstitial cell tumors.

In discussing clinical manifestations, the usual complaint is a unilateral testicular swelling. In seminoma, this is usually painless, while in embryonal and teratocarcinoma there may be local pain and tenderness. Caution must be taken in those pa-

From Brooke Army Hospital, Fort Sam Houston, Tex.

tients with pain and discomfort that they are not treated for a benign condition such as epididymitis. Heaviness felt on examination is usually associated with testicular tumor.

On examination a mass is palpable, varying in size, position, and regularity. Any scrotal mass which cannot be identified positively, regardless of size, shape, and position, should be investigated surgically through a high inguinal incision, and in the majority of cases, a rubber-shod, Doyen-type clamp should be applied to the proximal cord prior to delivery of the testicle. An increase in gonadotropins occurs in from 20 to 30 per cent of patients with testicular tumors. This frequently is of value, diagnostically and prognostically, particularly in chorioepithelioma.

The pure seminoma on microscopic examination consists of sheets of fairly large, usually oval cells, with prominent, well-staining nuclei. If there is any variation from this, such as a tendency to form rosettes or, in other words, glandular-appearing clumps of cells, we do not consider it a pure seminoma and treat it as we would an embryonal carcinoma. Tumors varying between this pattern and the adult tissue pattern seen in teratocarcinoma and teratoma, we classify as embryonal carcinoma. If cytotrophoblasts and syncytiotrophoblasts are present in any of the beforementioned tumors, we consider them to be chorioepithelioma, and anticipate the prognosis to be that of the most malignant component present.

TREATMENT

Pure seminoma. Treatment consists of high orchiectomy (inguinal orchiectomy) and x-ray therapy. This latter is given through 4 abdominal (2 anterior and 2 posterior opposing portals), 1 inguinal, 2 mediastinal (anterior and posterior) and 2 left supraclavicular portals (anterior and posterior). Approximately 2400 r in air is given to the inguinal portal; 3000 to 3600 r in air to each abdominal portal; 3000 r in air to the anterior and posterior mediastinal portals; and 2400 r in air to each left supraclavicular portal, front and back. Treatment factors are 200 kv; 15 ma.; focus-skin distance, 50 cm; and half-value layer, 1.25 mm copper.

Embryonal carcinoma. High orchiectomy with radical node dissection is done, and x-ray therapy is given approximately the same as in the seminoma, except that we give these patients as near to 3600 r as possible in air through all portals in the abdominal area, because it was shown by Friedman and Moore and Lewis[3] that ordinarily this tumor will respond to approximately 3200 r in air, tumor dose.

Teratocarcinoma. High orchiectomy with radical node dissection is used and x-ray therapy is given only if the nodes are positive.

TABLE 1. *Patients with tumors of the testis*
4-year (February 1952) and 8-year (February 1956) comparisons

Type of tumor	Number of patients		Average age on initial diagnosis (years)	Treatment			Radical node resection		History of trauma	Average survival following diagnosis and treatment (months)	Longest survival (months)
	Alive	Dead		Surgical	X-ray	Both	Positive	Negative			
Seminoma											
February 1952	14	–	29	–	–	14	1	5	4	30	54
February 1956	17	–	32	–	7	10	–	6	2	54	103
Embryonal carcinoma											
February 1952	10	–	28	–	–	10	6	1	–	15.5	43
	–	11	33	2	–	9	2	–	3	10.0	18
February 1956	7	–	25	–	–	7	4	3	–	47	71
	–	26	30	2	–	24	18	–	4	9	34
Chorioepithelioma											
February 1956	–	1	32	1	–	–	–	–	–	2	–
	–	3	31	1	–	2	1	–	–	6	15
Teratocarcinoma											
February 1952	10	–	23	–	–	10	1	5	3	25	47
	–	10	27	1	–	9	1	–	1	10	26
February 1956	19	–	24	4	–	15	5	12	3	50	88
	–	12	28	–	1	11	3	1	1	9	26
Interstitial cell											
February 1956	2	–	23	2	–	–	–	–	–	35	36

Teratoma. These are treated the same as teratocarcinoma.

In the *nongerminal* tumors such as *interstitial cell tumors,* only a high orchiectomy is performed. We do not believe a node dissection is indicated even though one group[2] found 7 cases of metastasis in 42 patients inasmuch as our own experience and that of Lewis has been contrary to this.

Lymphosarcoma, of which we have seen two cases in the last three years, is treated with high orchiectomy plus x-ray therapy only if there are metastatic lesions.

SURVIVAL RATES

The five-year survival rate at this hospital with this regimen for patients with seminoma has been 100 per cent. Other clinics have given a rate of from 80 to 90 per cent. The survival rate in cases of embryonal carcinoma at this hospital has fallen. Four years ago we could have reported a survival rate as high as 45 per cent, but a more recent survey has shown it to be 21.2 per cent. The teratocarcinoma survival rate is about 60 per cent; for chorioepithelioma, no survivals; and for adult teratoma and interstitial cell tumors the survival rates are 100 per cent.

Table 1 gives data on tumors of the testis treated at this hospital as of February 1952 and February 1956. There was a total of 102 patients with tumors of all types, the longest survival being eight and one-half years. It will be noted from this table that the results are continuing about the same except in embryonal carcinoma, in which the survival rate is found to have fallen to 21.2 per cent. This would seem to indicate that more extensive surgery, such as a thoraco-abdominal approach recommended by Leadbetter[4] and, in addition, bilateral dissection in the retroperitoneal area at the same sitting as recommended by Schwartz,[5] may be in order. We do not believe that any change in the present x-ray therapy will affect these results, as we have used both the 250 kv and million-volt machine in the past years. It would seem that the only answer in the highly malignant embryonal carcinoma is more radical surgery or earlier treatment.

SUMMARY

In summary, we have briefly discussed tumors of the testis and presented the treatment we now use in tumors of the testis. Attention is directed to the treatment of embryonal carcinoma, which in our recent, as well as other series reviewed, shows a distressingly low survival rate. We have recently become advocates of more radical surgery in this group and hope to be able to report better results in that series at a later date.

REFERENCES

1. Melicow, M. M.: Classification of tumors of the testis; clinical and pathological study based on 105 primary and 13 secondary cases in adults and 3 primary and 4 secondary cases in children. *J. Urol.* 73: 547-574, Mar. 1955.

2. Friedman, N. B., and Moore, R. A.: Tumors of testis; report of 922 cases. *Military Surgeon* 99: 573-593, Nov. 1946.

3. Lewis, L. G.: Testis tumors; report on 250 cases. *J. Urol.* 59: 763-772, Apr. 1948.

4. Leadbetter, W. F.: Treatment of testis tumors based on their pathologic behavior. *J. A. M. A.* 151: 275-280, Jan. 24, 1953.

5. Schwartz, J. W.: Paper read at the Kimbrough Urological Seminar, Walter Reed Army Medical Center, Washington, D. C., Sept. 1955. Unpublished.

THE TEACHER

Something of this frame of mind is to be found in many of the teaching staff. They view their encounters with the students with weary resignation, and when they are over they retire with a sigh of relief to their important work in their dark little cubbyhole in the attic. Many of them have little patience with the crude problems evolved by lower intelligences, and when students approach them for enlightenment they may be testily rebuffed. Students are often annoying, and their examination scripts frequently indicate an effervescence of dullness hardly to be credited. Nevertheless it is our job to help and encourage them, just as they will in turn help and encourage patients; we lose nothing by being approachable, and they gain a great deal. One of the most important features of a good teacher is that the students should have free and ready access to him. In too many departments, particularly where the senior staff are much occupied with research or administration, they appear to the students as remote Olympians, momentarily descending from the heights to deliver a lecture or to administer an examination. To take one's difficulties to such a preceptor would savor of impropriety.

—D. C. SINCLAIR, M. D.
in *Medical Students and Medical Sciences*, Oxford University Press
1955, p. 38

SOMNAMBULISM

Psychiatric Interview Studies

CHESTER M. PIERCE, *Lieutenant, MC, USNR*
HARRY H. LIPCON, *Captain, MC, USN*

FREQUENTLY the somnambulist is found not to possess sufficient psychologic assets to warrant retention in the naval service. Less often, a sleepwalker is adjudged psychologically adequate, but then is obliged to remain at a shore station in a permanent limited duty status. The sleepwalker who fails to come to the attention of the Naval Medical Department is in incessant danger of serious accident, particularly at sea. Accordingly, the somnambulist represents an actual medical and legal hazard to the Navy. In addition, he theoretically is a personnel liability, because even while working in a restricted capacity he is apt to succumb to an injury causing lost man-hours. Also, since he is limited in duty, he is less likely to consider re-enlistment.

The present report is part of an exploratory study which was made in order to elucidate further channels for investigating the problem of immaturity with symptomatic habit reactions. This article deals with psychiatric interviews on sleepwalkers observed to be somnambulistic while in recruit training and reported, by social service reports from their home towns, to have been somnambulistic prior to enlistment. The work suggests that in some physiologically predisposed adolescent males, emotional stresses may precipitate a bout of somnambulism.

Two goals exist as over-all objectives in this pilot research: (1) to determine which recruits are rehabilitable for the naval service and (2) to discover any objective methods which would aid in the quicker detection of the nonrehabilitable recruit. Other reports by us outline the economic, morale, and training problems engendered by symptomatic immaturity reactions.[1,2] Inasmuch as those same reports described the material and method as well as criticized the limitations of the study, methodology now will be considered only in a cursory fashion.

MATERIAL AND METHODS

Thirty-four recruit sleepwalkers, who appeared before a Naval Aptitude Board because of unsuitability for service, were com-

From U. S. Naval Hospital, Great Lakes, Ill.

pared with 60 nonsomnambulistic electronic school students. All men were interviewed by the same examiner (CMP) for about 35 minutes. The examiner had at his disposal a questionnaire filled out by each sailor that indicated information germane to somnambulism. The medical officer also had perused the corpsmen's notes, medical records, social service data, and company commander reports on all the recruits interviewed.

In order to gather uniform material, the interviews were highly structured and demanded many direct questions. An aim was made only to locate group trends in regard to interpersonal adjustment, conation, interests, psychodynamic reactions and experiences, and attitudes toward sleepwalking. After prolonged contact with the subject (during physical and neurologic examinations, procurement of medical history and laboratory studies, completion of electroencephalographic studies and projective tests, and examination of the various documents) the clinical summation interview procured sufficient information for a diagnostic formulation on each person.

RESULTS

At times in this report, quantitative data procured for comparative purposes in an identical manner from 60 enuretics will be introduced but not interpreted by statistical analysis. There were no detectable group differences in the manner in which the experimental and control subjects presented themselves or handled themselves in the interviews.

Attitude Toward Sleepwalking. Fifteen of the sleepwalkers expressed a fear of injury and 15 others expressed no concern over their habit. Typically, members of the former group volunteered, "I worry I might hurt myself," while those of the latter dismissed the difficulty by stating casually, "Oh, I never even think about it!" Two men when queried only indulged in a fantasy of wishing that they did not have the habit. One man noted the necessity of carefully putting away household articles, while another told of intense self-anger whenever he had sleepwalked.

The most characteristic attitudes about sleepwalking are either a dread of anticipated bodily injury as the result of an accident or a strong defense of indifference in regard to the symptom.

Vocational Aspirations. As shown in table 1, the homogeneous control group cherished superior conative values. The sleepwalkers were content to strive for a modest living standard through means which required no aggressivity or competitive effort on their part. Even those sleepwalkers expecting to farm or to go into business were doing so because they could be set up by a relative. The examiner believed that many sleepwalkers had intellectual and personality assets sufficient for continuing their education or becoming tradesmen.

TABLE 1. *Vocational aspirations of controls, sleepwalkers, and enuretics*

Future plans	Controls (60)		Sleepwalkers (34)		Enuretics (60)	
	No.	%	No.	%	No.	%
None	10	16.6	5	14.7	16	26.6
Professional	4	6.6	0	0.0	1	1.6
Skilled labor or continuance of education	46	76.6	9	26.4	23	38.3
Unskilled labor	0	0.0	11	32.3	12	20.0
Farming	0	0.0	7	20.5	8	13.3
Business	0	0.0	2	5.8	0	0.0

Avocational Interests. A wide spectrum of interests was displayed by the somnambulists who as a group pursued a fair number of hobbies (table 2). Psychodynamically, however, their hobbies subserve different sublimation needs. In the control group six men were photographers, while no somnambulist mentioned this hobby. In contrast to both the control and enuretic groups, no sleepwalker indulged in the hobby of wood carving or metal hammering.

Sports. It is of high statistical significance that, compared to the controls, sleepwalkers were uninterested in athletics (table 3) (χ^2=11.11, $P<0.01$). In view of their good health and the cultural accent on sports interests in the adolescent male, this finding emphasizes the lack of narcissism and aggression implied in the somnambulist's vocational and avocational inclinations.

TABLE 2. *Hobbies of controls, sleepwalkers, and enuretics*

Hobby	Controls (60)	Sleepwalkers (34)	Enuretics (60)
None	19	15	28
Outdoor recreation	15	9	10
Mechanics	10	6	11
Crafts	10	4	3
Modeling	11	3	3
Music	5	2	2
Electronics	9	0	0
Collecting	7	1	2
Total	67	25	31

Neuropathic Traits. There was no statistical significance between the groups in their history of nailbiting, thumbsucking, stammering, or stuttering. Men in the control group were prone to have dreams in which they were engaged in sexual intercourse. Usually the subject dreamed of a beautiful stranger about his own age.

TABLE 3. *Athletic interests of controls, sleepwalkers, and enuretics*

Athletic interest	Controls (60)		Sleepwalkers (34)		Enuretics (60)	
	No.	%	No.	%	No.	%
No interest	18	30.0	23	67.6	16	26.6
Moderate (some participation in organized athletics and some general knowledge about sports and sports events)	12	20.0	6	17.6	13	21.6
Active (intensification of above)	30	50.0	5	14.7	31	51.6

Fifteen of the sleepwalkers and 12 of the controls had had temper tantrums (χ^2=4.96, P<0.05). Twenty-two of the sleepwalkers and 20 of the controls had suffered periodic nightmares (χ^2=7.34, P<0.01). Twenty-one of the sleepwalkers and 17 of the controls had had a problem of enuresis (χ^2=8.86, P<0.01). One sleepwalker had attacks of sleep paralysis but no history to suggest narcolepsy or cataplexy.

Sixteen of the sleepwalkers and 11 of the controls gave a history of acrophobia (χ^2=7.31, P<0.01). Many other phobic reactions were discovered which were common to both groups, including nyctophobia, aquaphobia, agoraphobia, hematophobia, astrophobia, and claustrophobia. Three sleepwalkers had a cardiophobia and one had a pyrophobia. One control had an electrophobia.

Statistical pertinence is found in the experimental group's history of acrophobia, temper tantrums, enuresis, and nightmares. The wish-fulfilling dreams of the controls are thought to represent more suppressed attitudes toward overt sexual activity.

Adjustive Capacity. The method of estimation of adjustment and some reasons for the relatively poor adjustment of the controls have been recorded.[3] The experimental group of sleepwalkers is seen to fare well when compared with the other groups (table 4). In regard to their military adjustment, many of the sleepwalkers had obtained satisfactory or above-average company commander reports and related so well in the interview and while under observation in the neuropsychiatric unit that it was surprising that these same men verbalized such strong dissatisfaction for further service.

Sleepwalking Factors. Twenty sleepwalkers (58.8 per cent) indicated "lifelong" somnambulism. The remaining 14 (41.2 per cent) began to sleepwalk at an average age of 10.3 years, with onset ranging from 7 to 15 years.

TABLE 4. *Adjustments of controls, sleepwalkers, and enuretics*

Area of adjustment	Controls (per cent)	Sleepwalkers (per cent)	Enuretics (per cent)
Interpersonal relations estimated as less than adequate	26.7	20.1	35.0
School adjustment estimated as less than adequate	35.0	23.5	65.0
Service adjustment estimated as less than adequate	35.0	76.5	78.3
Claims to have had intercourse	53.3	70.6	66.7

In nine cases (26.5 per cent) emotional experiences appeared to have precipitated the first episode of sleepwalking. Three men began their habit upon separation from their mother. Two men started immediately after the birth of a sibling (one male sibling, one female). One of these men had received a lecture on the origin of babies, during which time his mother deliberately exposed herself and made incidental but dramatic commentary on the chronic physical anguish she suffered as a result of a burn involving her chest, back, and buttocks. Another man, rachitic in infancy, developed an ocular paresis which interfered with interpersonal relations at school. He became increasingly shy and began to daydream rather than attend to his recitations. As a result he soon concluded that failure of the fourth grade was imminent. He "worried" excessively about his parents' response to his failure, and in this setting he first began to sleepwalk. One man began to sleepwalk shortly after conscious realization of secondary gains a sibling had achieved through this habit. One subject suffered a skull fracture, and in addition the attending doctors discovered he had Bright's disease. After hospitalization this man began to sleepwalk when his parents made him sleep in their room. One man began to sleepwalk following the death of a parent.

Twenty-four somnambulists (70.5 per cent) believed that apprehension and preoccupation concerning the future, past grievances, or finances would bring on an episode of sleepwalking. Six (17.6 per cent) noted that exertion would increase the probability of sleepwalking. Three (8.8 per cent) stated that unusual noises would cause them to sleepwalk. One recruit related sleepwalking spells to long automobile rides, and another claimed that sleepwalking followed ingestion of green foods. Six (17.6 per cent) knew of no situation which would induce an episode of sleepwalking.

A dream, usually terrifying, was frequently a part of the actual sleepwalking in 10 recruits (29.4 per cent). Six recruits (17.6 per cent) made spontaneous mention of déjà vu phenomena occurring during somnambulistic bouts. Two recruits (5.8 per cent) were destructively violent when sleepwalking. Several somnambulists told of hearing voices during their sleep. There was no spontaneous reference to olfactory sensation. In only one man was there a history of a dissociative state. There were no cases of Kleine-Levin syndrome.

In most cases a sleepwalker, over the years of his perambulations, had wandered through his whole house. Very seldom did a somnambulist confine his sleepwalking to a particular location in his home. Only three (8.8 per cent) routinely went to their parents' room. Eleven (32.4 per cent) had walked out of the house while asleep. Eight (23.5 per cent) often walked to the bathroom in order to urinate. Five of these men were enuretic. Three (8.8 per cent) walked to the kitchen where they prepared a nocturnal repast. Interestingly, these recruits would sleepwalk following arguments with their parents which caused "worry" when they retired.

Despite the constant fear of injury, no one in this series had incurred serious injury while sleepwalking. In fact, only five (14.7 per cent) could recall any injury sustained while asleep.

Usually, the recruit awakened himself from his sleepwalking or would infer sleepwalking because on arising he would not be in his own bed. Only one admitted that he had ever awakened in his mother's bed. One other recruit often awakened in a brother's bed. Generally, the sleepwalker went to a vacant bed, chair, or couch. Sometimes he was observed silently by family members who would tell him about his sleepwalking the following day. At other times a parent, never a sibling, would see the sleepwalker safely into bed. Sometimes the displacement of familiar objects from their customary position would provide the only clue to the subject's perambulations. For instance, a man might awaken and be unable to locate his keys or his bathrobe.

Twenty (58.8 per cent) of the recruits slept by themselves in the year preceding entrance into the Navy. One other slept alone, but in his parents' room because of their concern for his safety. Eight (23.5 per cent) slept with a sibling. Three of these siblings also were sleepwalkers. Four slept with their wives. One slept with four other siblings.

Psychogenetic Dynamics. The only area of investigation showing statistical pertinence in this series (table 5) is that indicating chronic ill health in the parents of the sleepwalkers. Protracted illness in a parent imposed many psychologic and socioeconomic burdens on the experimental group.

It was found that one half of the 16 parents of sleepwalkers who had chronic degenerative disease suffered from cancer or chronic cardiac illness. Over one fourth of the parents with chronic ill health had disabling musculoskeletal disease. Most of the remaining parents in this group had progressive mental illness. These considerations, when coupled with the trend of propensity to deaths from gastro-intestinal tract cancer, suggest that the parents of sleepwalkers may be physiologically "older than their stated age."

By the age of 10 years nearly 30 per cent of all the sleepwalkers were separated from their parents or were living in a home where a parent was incapacitated through chronic illness.

Diagnosis. Except for the men who are better described as psychopathic personalities,[3] diagnostic formulations (table 6) were made in accordance with the procedure outlined in the Joint Armed Forces Psychiatric Nomenclature.[4] In those instances of mental deficiency as determined by psychometric examination, a predominating character defect was made the primary diagnostic consideration.

In this study nearly one half of the sleepwalkers depicted the diagnostic complex of passive aggressive-passive dependent. The remaining men received a wide variety of diagnoses.

DISCUSSION

Two characteristics are outstanding in the recruit somnambulist who is discharged from the service because of unsuitability. First of all, he is found to have made a seemingly adequate life adjustment; secondly, he is found to make use of strong repressive mechanisms successfully in many areas. These two findings are mutually dependent and account for the discovery that the sleepwalker is able to verbalize no emotional distress at situations in his life that ordinarily might be expected to provoke charged affect. In reality, however, the sleepwalker's adequate adjustment is spurious, and like the facade of emotional tranquillity, can best be interpreted in terms of psychodynamics. The dynamic interpretation offers clues both to the described behavior and to the symptomatic habit reaction of somnambulism.

To combat a lack of self-confidence, the sleepwalker routinely performs in a socially acceptable manner so as not to draw attention to his deficiencies. As a result of this overcompensatory striving the somnambulist partially obliterates a basic (and probably conscious) feeling of personal inadequacy. Thus it is that the sleepwalker attains satisfactory function through modest ambitions, over-conformity, and avoidance of known pressure situations such as sports activity. He is so skillful in this achievement that to the doctor and to the military officer it is

often a surprise that this man has been unable to adapt to the service. The application of minimal pressure is sufficient to disturb the delicate equilibrium in which the sleepwalker has

TABLE 5. *Dynamic factors in controls, sleepwalkers, and enuretics*

Dynamic factor	Controls (60)	Sleepwalkers (34)	Enuretics (60)
Father regarded as authoritarian	26	12	22
Open conflict with father	10	2	12
Father physically abusive	7	1	10
Father regarded as alcoholic	10	4	15
Mother regarded as authoritarian	6	3	5
Open conflict with mother	8	2	1
Mother regarded as seductive	7	0	15
Father verbalized suspicions of mother's fidelity	3	1	8
Subject was favorite of father or mother	4	3	4
Subject was favorite of both parents	1	1	3
Evidence of severe sibling rivalry	7	3	23
Parents regarded as strict	2	7	13
Parents regarded as religious	14	12	12
Alleged idyllic home situation	36	21	31
Number of parents regarded to be in chronic ill health	4	16*	26
Reared in a broken home (through death, desertion, divorce, or separation by age 10)	16	7	14
Verbalizes martyrdom to family	0	2	5
Number of married men	2	4	4
Verbalizes a belief that wife is unfaithful	0	0	4
Verbalizes that a divorce is being seriously considered	0	0	3
Average age of living mothers	48.7	44.3	43.0
Average age of living fathers	49.7	49.2	47.9

TABLE 5. *Dynamic factors in controls, sleepwalkers, and enuretics* —Continued

Dynamic factor	Controls (60)	Sleepwalkers (34)	Enuretics (60)
Average age of deceased parents	44.4	49.5	39.6
Average age of subject when parent died	7.7	12.3	6.1
Number of deceased parents	7	6	7
Number of deceased parents who died from cancer of the gastrointestinal tract	1	4	1

*Of statistical significance. (χ^2=18.98, P<0.01)

TABLE 6. *Diagnoses of controls, sleepwalkers, and enuretics*

Diagnosis	Controls (60)		Sleepwalkers (34)		Enuretics (60)	
	No.	%	No.	%	No.	%
Without psychiatric diagnosis	27	45.0	6	17.6	9	15.0
Passive aggressive—passive dependent	18	30.0	16	47.0	25	41.6
Inadequate personality	0	0.0	2	5.8	7	11.6
Psychopathic personality	2	3.3	1	2.9	2	3.3
Schizoid personality	12	20.0	3	8.8	9	15.0
Schizophrenia	1	1.6	2	5.8	2	3.3
Obsessive-compulsive neurosis	0	0.0	1	2.9	2	3.3
Emotional instability reaction	0	0.0	2	5.8	3	5.0
Aggressive reaction	0	0.0	1	2.9	1	1.6

made his pseudo-adjustment. With additional stress the sleepwalker withers and acts the role of the little boy who "quits and takes his ball and goes home." After such humiliation the sleepwalker resorts to "worry" and it is at this time that an episode of sleepwalking is likely to occur.

Specifically, the sleepwalking itself helps to solve a particular emotional problem without danger of insult to the ego. The sleepwalking act, generally, offers temporary amelioration of a knotty oedipal problem, which is a factor in nearly all sleepwalkers and may be crucial in sustaining the feeling of inadequacy. The same factor generates the pseudo-adjustment and forces the need for repressive mechanisms.

In our subjects sleepwalking diminished the intensity of particular problems and provided a safe outlet for anxiety about future events or the need to retaliate for feeling angered or

slighted. Sometimes the specific act seemed to thwart overt aggression and thereby supplied the sleepwalker with safety from retribution by an adversary. Several illustrative cases may be cited. For instance, one recruit went to bed worried about probable accumulation of demerits because of dirty clothing. That night he was observed washing his clothes while asleep. Another recruit worried about his insignificant position in the company. In the Navy his sleepwalking episodes were accompanied by an auditory illusion that his name was being blared out on a loudspeaker. A third recruit walked in his sleep after worry over his failure, during a liberty, to accept a challenge to fight a love rival who outweighed him by 30 pounds. Many examples of this sort of problem solving were given by recruits who had obtained insight into the nature of their sleepwalking.

There were other instances of problem solving in which no insight developed. In the Navy it is not uncommon to see a man in an anxiety state, suggestive of homosexual panic, following sleepwalking. If he has frequently walked in his sleep, it is at first difficult to understand the anxiety. When further history is obtained, it is found that the man developed his anxiety after sleepwalking to another man's bunk or waking up wearing another man's pants. Cases of this type demonstrate an attempt to solve the problem of unacceptable, repressed ideation that is gaining consciousness.

At home, sleepwalking episodes often expressed a desire to get parental attention. The sleepwalker can tell of sleepwalking after planning consciously to protest exploitation by the family. A sleepwalking episode might result in walking away from a sibling (who never cared enough to awaken the patient even when he observed the sleepwalking). A man might walk to the kitchen while asleep in order to gratify oral longings after losing parental favor.

Since repression is so marked in these sleepwalkers it may be that sleepwalking episodes allow ambulation from incestuous desire and/or allow an acceptable excuse to receive the mother's attention. In this series of cases the recalled onset of sleepwalking about the period of oedipal latency coincided with the period during which many of the recruits became separated from their parents or became residents in a home where one parent was infirmed. This consideration aggravated the unresolved oedipal problem. Here too there are many examples, such as the case of the son of a crippled father, who slept with his mother throughout his childhood. He recalled that worrying about his father's ill health (while the father was sleeping in another room) would precede somnambulism. Another man would worry over being in the same household with his stepfather, since "I can't get used to the idea of a stepfather." Subsequent to intense worry on this subject, the patient would sleepwalk.

There are a host of physiologic factors operative in sleepwalkers which may be active at those times when emotional upsets are able to produce a bout of somnambulism. In this study many episodes of sleepwalking occurred when a man believed he was urinating (and in some cases he actually walked to the bathroom). The sleepwalker is more likely than the control to have an abnormal electroencephalogram, a history of enuresis, genito-urinary complaints, and a history of sleepwalking.[2] The sleepwalker's attacks are associated commonly with the phenomenon of déjà vu, auditory illusions, and terror or other violent emotion in a person with a childhood history of emotional lability. Accordingly, advances in neurophysiologic knowledge of the temporal lobe may clarify some questions concerning somnambulism. Also, besides showing the need for more knowledge of the metabolism of sleep, the findings of this study hint that acrophobia in the sleepwalker and degenerative diseases in his parents may be of biologic significance.

SUMMARY

Psychiatric interview studies were conducted on 34 sleepwalkers and 60 nonsomnambulistic controls. A significantly larger proportion of sleepwalkers have a history of enuresis, temper tantrums, nightmares, and acrophobia.

The sleepwalker is relatively uninterested in sports. He frequently began to sleepwalk around the time when one of his parents first suffered a chronic illness. Descriptively, the sleepwalker shows a pseudo-adjustment and relies upon strong repressive defenses. Psychologically, the sleepwalking episodes represent an attempt to solve problems through safe channels and an attempt to resolve oedipal indecision. Physiologically, there is some suggestive evidence that in some cases the temporal lobe may be involved as the organic pathway for the precipitation of sleepwalking episodes following emotional duress.

REFERENCES

1. Pierce, C. M.; Lipcon, H. H.; McLary, J. H.; and Noble, H. F.: Enuresis; clinical laboratory and electroencephalographic studies. *U. S. Armed Forces M. J.* 7: 208-219, Feb. 1956.

2. Pierce, C. M.; Lipcon, H. H.; McLary, J. H.; and Noble, H. F.: Enuresis; psychiatric interview studies. To be published.

3. Cleckley, H.: *The Mask of Sanity.* 2d edition. C. V. Mosby Co., St. Louis, Mo., 1950. pp. 355-356.

4. *Joint Armed Forces Nomenclature and Method of Recording Psychiatric Conditions.* U. S. Government Printing Office, Washington, D. C., 1949. pp. 3-12.

392347 O - 56 - 5

SEBACEOUS CYST:
A Modified Method for Surgical Excision

DANIEL C. BELDEN, *Commander, MC, USNR*

ONE of the problems in surgical excision of a sebaceous cyst is that of cyst-wall rupture or penetration. By using a modified technic, excellent results were obtained in a series of 25 patients. The cystic growth was excised without rupture of the wall, thereby achieving complete removal in every case. Follow-up of each patient for eight months revealed neither recurrence of the cyst nor infection in the operative site, and there was excellent scar formation with no secondary breakdown. A review of the recent literature fails to disclose any previous use of the particular technic employed.

Essentially, the treatment of a sebaceous cyst is concerned with one of the following phases of cyst formation: (1) noninfection or preinfection stage, (2) infection stage, and (3) postinfection or healed stage.

In the *noninfection stage,* the treatment of choice is surgical excision. Where the overlying skin is thick, the usual technic for excising such cysts may be used. The incision is made directly over the dome of the cyst, following the natural skin lines to minimize scar formation. If the mass is sufficiently large to produce skin redundancy, an elliptical incision is made over the dome, leaving a portion of skin attached to the cyst wall to be removed with it. The incision is carried down to the cyst wall; then by careful dissection the mass is extruded from its bed and removed. Should the overlying skin be extremely thin, however, then the modified incision described below may give much better results.

In the *infection stage,* the treatment of choice is incising and emptying the cyst, allowing healing by granulation.

In the *postinfection* or *healed stage,* if incision and drainage have been performed previously, the incisional scar is usually directly over the cystic swelling, the covering skin now being paper thin and firmly adherent to the cyst wall. There also are previously infected but now noninfectious cysts which, though never incised, have perforated spontaneously. Frequently these

From 5th Marine Regiment, 1st Marine Division, FMF, Camp Pendleton, Calif.

too have a paper-thin covering. To attempt incision directly over the mass in these cases and expect an intact cystic sac is overly optimistic. At best, it is extremely difficult to dissect out a thin-walled sac, even a noninfected one, without rupturing it; and it is essential to remove the cyst in its entirety because any portion of the sebaceous-secreting epithelial lining that is left behind may cause the cyst to re-form.

Should the cyst be ruptured by accident and have to be removed piecemeal, every effort must be made to clean out all grossly apparent cystic wall remnants. Occasionally, cauterization with carbolic acid[1] or silver nitrate may be used, but I believe that this causes excessive tissue damage with a greater possibility of postoperative inflammatory reaction or infection, or both. The solution, therefore, is removal of the sebaceous cyst, intact. To this end, I have utilized a procedure for excising the entire cyst that minimizes breakage of the cyst wall. The procedure is used primarily for cysts with extremely thin covering, where incision into the thinned-out, darkened skin directly over the mass would almost invariably result in penetration of the cyst cavity.

TECHNIC

After local infiltration of 1 per cent procaine circumscribing the cyst area, a semilunar incision, made around one-half of the periphery of the cyst (fig. 1), is carried down to the subcutaneous fatty tissue. With blunt scissor dissection, the cleavage plane is obtained and extended to both limits of the incision (fig. 2). The

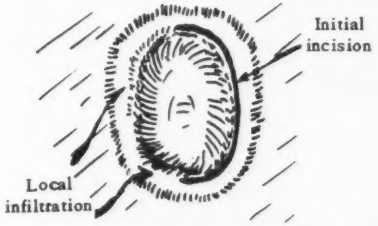


Figure 1

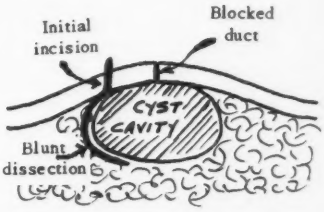


Figure 2

free edge of skin attached to the underlying cyst is grasped with Allis' forceps and everted, thus further exposing the cleavage plane to be followed. As the cyst is everted still more, the dissection is carried out in close approximation to the cyst wall until it approaches the under surface of the skin (fig. 3). Then, depending on the amount of redundancy of skin caused by enlargement of the cyst, a second semilunar incision is made in the skin, matching the initial incision in direction, but with opposite convexity (fig. 4). This allows a portion of the attached redundancy to come away with the cyst, and affords a clean, flattened surface for healing.

The walls of the cavity are approximated with No. 0000 plain catgut sutures and the skin is closed with interrupted No. 0000 silk mattress sutures (fig. 5). A pressure dressing is applied, with instructions to the patient to apply gentle digital pressure to the operative area several times daily to prevent subcutaneous venous bleeding postoperatively. The sutures are removed in from four to six days.

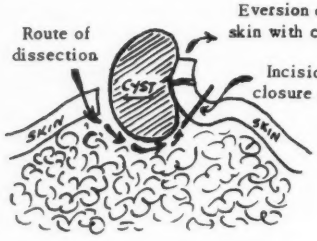


Figure 3

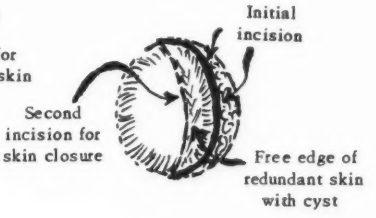


Figure 4

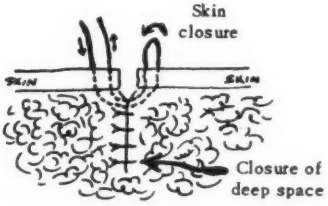


Figure 5

SUMMARY

A series of 25 patients were treated for the removal of sebaceous cysts using a modified technic to ensure complete excision of cystic structure. None of the patients had a recurrence or postoperative infection, and discomfort was minimal. The modification described is primarily intended for removal of sebaceous cysts covered by extremely thin skin, where direct incision and dissection will almost invariably result in rupture of the cyst wall. It also minimizes the necessity for lengthy traumatic manipulation. Complete extirpation of sebaceous cysts is essential to prevent recurrence, and is made more nearly possible by the modification described.

REFERENCE

1. Danna, J. A.: Treatment of sebaceous cyst by electrosurgical marsupialization. *Ann. Surg.* 123: 952-956, May 1946.

AN OUTLINE FOR A NEW APPROACH TO THE PROBLEM OF HIGHWAY ACCIDENTS

FREDERICK L. McGUIRE, *Lieutenant, MSC, USN*

IF THE military is to make significant advances toward the solution of its automobile accident problem, I believe that a new and basic definition of the problem itself is essential. The proper definition must come before the solution. This article outlines such a definition, together with its rationale, and presents a proposed plan of action.

It is not necessary to discuss in detail the problem with which the military is faced. In terms of deaths, persons injured, money lost, lessened economic production, and lowered military efficiency, automobile accidents are one of our most serious social and economic problems. The tragedy of a preventable manpower loss that is greater than that incurred in all of our wars combined demands the attention of all of us, not only as professional people but also as responsible members of the military community.

THE PRESENT DILEMMA

It is my belief that we have achieved a stalemate in our attempts to lower the accident rate. Our current technics are based upon academic principles, and their effect has reached a point of diminishing returns. If we were suddenly blessed with a great increase in money and talent and simply doubled or redoubled our efforts with no change in philosophy or methodology, we would bring about no proportionate decrease in the accident rate. This is illustrated by the many intensive holiday safety campaigns we have waged in recent years, only to have them yield a less than significant decrease, or no decrease at all. Even the one notable exception, the Safe Driving Day campaigns, results in a decrease in accidents only for a single day and holds no promise of being effective over a longer period of time.

Some of our states have at various times waged vigorous and ambitious enforcement and educational programs in an attempt to change the course of their accident toll. While some of these efforts met with success at first, these state officials have since had the frustrating experience of watching the accident curve

From U. S. Naval Hospital, Philadelphia, Pa.

slowly but surely rise toward its initial level. This is not to say that our present methods are worthless, for they are responsible for whatever progress we have made, and to abandon them without substitution would be disastrous. But we should reorganize our thinking about these methods in the expectation of producing new gains.

If we are to make significant advances in our accident programing we must do more than simply work harder—we must seek a different approach, a different definition of the problem. This definition, I believe, must be in terms of the personality, attitudes, and behavior traits of the individual drivers.

In all accidents on our highways, vehicle defects are listed as being involved less than 5 per cent of the time.[1,2] Also, there is no evidence to indicate that the design and engineering of the road and such factors as weather are the cause of more than a small percentage of the accident total. In addition, all evidence gathered over the past 30 years indicates that such physical factors as vision, hearing, reaction time, et cetera, play but a very small part in accident production.[3]

On the other hand there is mounting evidence that the basic personality of each driver is the largest single cause of accidents and plays an important part in those accidents where the first-mentioned factors can be isolated. That is to say, for example, that while vehicle defects may cause an accident, the tendency would be for certain personality groups to become involved because of their faulty attitudes toward such things as faulty brakes, poor headlights, et cetera. I found[4] that those individuals who tend to be accident-free tended to be more mature, more conservative, and more intellectual and thoughtful, to have a higher aspiration level, and to have had a happier and better adjusted childhood than did other drivers. This was true regardless of age, IQ, education, driving experience or mileage, or marital status. In his study, Tillman[5] showed that, when compared with a low-accident group, his group of accident repeaters were less stable, less mature, and irresponsible to the point of being borderline sociopaths.

The large difference between these groups and the significance of this difference have led me to hypothesize that at least 80 or 90 per cent of all automobile accidents that occur beyond chance are caused by the interplay between the basic personality of the driver and his driving environment. If this is true, any safety program designed according to the basic behavior traits of the accident-producing driver is pointing itself directly at the core of the problem instead of dissipating its energy by trying to reach all drivers, accident-producing or not, and reaching them

in terms of factors that do not necessarily influence their accident-producing behavior.

There is no logic in trying to impress a driver with the need for safe driving if he is already the type whose personality causes him to be cautious, conservative, and respectful of the rights and safety of others when he is behind the wheel. By the same token, there is no logic in spending time and money trying to impress a person with the need for respecting the driving rights of others if his personality dictates that he indulge in antisocial and asocial behavior. No simple plea to reason ever influenced the conduct, for example, of the confirmed sociopath.

THE PERSONALITY GROUPS

This line of reasoning requires that in designing a safety program we first define the different personality groups we must reach and then devise special technics for influencing their behavior. I have listed the personality groups that I believe best define our driving population, together with some idea of what kind of approach is needed.

Group 1 consists of those individuals who routinely exhibit responsible, mature behavior. They respect the community and accept the responsibilities of citizenship. They are even tempered and display anger and aggression only when appropriate. They are effective in their jobs and are capable of establishing warm and satisfying human relationships. They become upset and engage in inappropriate behavior only as a result of sudden and unusual happenings and quickly recover. They are excellent driving risks.

It is mostly members of this group that are reached by our present academic-type programs. They are capable of responding to an appeal to the intellect, but need to know by what rules they are expected to behave. This is especially true of our teenagers, many of whom are emotionally mature, but whom the adult population has failed by not having given them proper instruction. We know that, regardless of personality, such factors as years of driving experience play a significant role in accident production.[2] Emotional maturity is correlated with age but is not necessarily dependent upon it.

Groups 2 through 5 suffer from emotional disorders characterized by inner struggles and discordant social relationships. Two essential features of such disorders are that they are precipitated by emotional stresses, conflicts, and frustrations and that they are most effectively treated by psychologic technics. They are not produced by physical disorders and do not respond to routine medical attention.

Although often incapacitating and disturbing to the person and his associates, the symptoms of these persons are such that compulsory hospitalization or segregation is unnecessary. A few voluntarily seek hospital treatment, but the majority live at home and usually continue with their customary business and social activities. Symptoms are extremely varied. They may include anxiety, depressed spirits, inability to concentrate or make decisions, memory disturbances, heightened irritability, morbid doubts, irrational fears, insomnia, and inability to enjoy normal social relations.

Physical symptoms may include loss of control over some motor and sensory functions, shortness of breath, persistent tension, fatigue, headaches, gastro-intestinal disturbances, heart irregularities, temperature imbalances, and all kinds of aches and pains. About 5 to 10 per cent of the population exhibit such symptoms at any given time and as many as 20 per cent of the people have shown or will show such reactions at critical moments in their lives. About 8.5 per cent of the general population may show even more extreme symptoms, which could include destructive or assaultive tendencies, bizzare thinking, motor disorders, speech or memory defects, extreme alcoholism, et cetera.

THE NEUROTIC GROUPS

The members of group 2 are of a special type. They are either very mild cases or have developed technics for controlling the display of any inappropriate behavior. They often pay the penalty for such control by increased physical symptoms and are unable to derive any real satisfactions from human relationships, but they do manage to be very law-abiding, socially conforming, and cautious in everything they do (*i. e.*, "Casper Milquetoast"). They too make excellent driving risks.

Group 3 members also have personal problems but have not been as able to control the outward expression of their symptoms as well as members of group 2. They are law-abiding and accept social responsibility, but their problems periodically get the best of them and for long periods of time they are unable to operate efficiently in their everyday living. During these periods they are likely to not see red lights, forget to look behind them before making turns, neglect to give signals, and generally forget to observe routine cautions. This makes them prone to incur accidents and violations, but they are likely to have excellent driving records while not under the disturbing influence of their problems.

Group 4 members are almost constantly at the mercy of their problems. They may be basically law-abiding, conservative

citizens, but may also constantly, and often unwittingly, engage in accident- and violation-producing behavior. They make very poor driving risks.

THE SOCIOPATHS

Group 5 are those individuals known as sociopaths, sometimes referred to as psychopathic deviates. They exhibit disorders of an antisocial or asocial nature. They are constantly at odds with the world. They resent discipline and refuse to conform to accepted ethical and moral standards. They are thoughtless of the welfare of others, are devoid of honor and a sense of fair play, and experience no real remorse for their misdeeds. Their lives lack stability, direction, and tenacity of purpose. They change jobs frequently, and many lead a nomadic existence. They are generally described as cold, callous, shallow, cruel, infantile, and flighty in their moods. Many are ingratiating and have charming manners that enable them to make favorable impressions, some are aggressive and hard to get along with, others are weak, passive, and inadequate. Nearly all of them are selfish, stubborn, and egocentric.

About 1 per cent of the male population falls into this category. They are chronic traffic violators, and can be expected to have high accident records. They typically do not respond well even to intensive psychotherapy and cannot be expected to respond to less intense methods of education such as driver education or a modification thereof. There is some evidence that a large percentage of this group modify their behavior after the age of 35, especially if they have served a prison sentence (as in the case of civilians).

Members of group 5 should be screened from the driving population and their driving severely limited if not prohibited entirely. However, if such individuals do modify their behavior and become less of a threat on the highways after the age of 35 they deserve reconsideration at that time; perhaps a system of driving parole that would extend to these later years would be effective. Older individuals so screened from the driving population would have a much poorer prognosis and probably should be discriminated against for the rest of their driving lives. Laws prohibiting paroled convicts from driving a car have probably performed an unwitting service in the cause of highway safety and should be extended with that in mind. Fortunately, most members of group 5 are sooner or later separated from the armed services for various reasons.

THE PHYSICALLY DEFECTIVE

Members of group 6 exhibit several types of conditions, including epilepsy, diabetes, mental deficiency, and a variety of

physical conditions that are able, or potentially able, to produce unsafe driving behavior. However, they are all capable of falling into one of the other categories and must be treated individually.

About one out of 250 persons suffers from epilepsy. Obviously, these persons might make poor accident risks, although the risk varies according to type of illness, the degree of success in controlling it medically, and the individual's personality type. The driving potential of each diabetic depends upon the type of his disorder, the nature and frequency of medication required to control his symptoms, and his type of personality. About one million of the population are mentally deficient. Whether or not a mental defective is a driving hazard depends upon the particular personality which provides the context for the condition. The driving behavior of any given defective may fall into any of the other groups. However, he would not necessarily be amenable to the same approach of education as the other groups and so must be treated as an individual case in both diagnosis and treatment. It is probably no mistake to allow a defective to drive if he exhibits a good driving record and/or shows himself to be socially responsible and able to follow the rules of the road. Many such individuals make excellent drivers.

Obviously, these six groupings overlap, and any given individual may well be placed in more than one category at any given time. However, they serve as guides and should permit the effective placement of each driver for purposes of treatment.

EDUCATION AND TREATMENT

The treatment or educational program outlined in table 1 is concerned primarily with the emotional makeup of the driver. An educational situation that is based upon good psychotherapeutic principles requires that each individual be given an opportunity to explore his own personality in a free and permissive fashion so that he can eventually reorganize his outlook on life to the point where his problems become less threatening and are less able to produce inefficient bahavior.

The work would ordinarily be conducted in small groups and by professionally qualified personnel, a fact which is likely to be a big obstacle since such personnel are in short supply and practically none are presently engaged with the problem of highway accidents.

However, the basic principles of this approach can also be applied to the population at large by a well-conceived propaganda program. Such a program would have to be based mostly upon emotional values rather than intellectual. The use of reason not only is limited in its effectiveness when used as a means of mass communication, but it promises to reach mostly those individuals

TABLE 1. *Personality groups found among driving population, with expected driving behavior of each group and suggested method of treatment*

Group	Type	Expected driving record	Program of treatment
1	Well adjusted; are upset only rarely by transient events and recover quickly	Almost never have an accident or incur a violation	Driver education based on pedagogic principles
2	Have emotional problems, but are socially responsible and are under rigid self-control	Almost never have an accident or incur a violation	Driver education based on both academic and psychotherapeutic technics
3	Socially responsible, but have emotional problems and are prone to upset for long periods of time	Will have periods of weeks or even months in which they are a poor accident and violation risk	Group psychotherapy with some driver education appended
4	Socially responsible, but have emotional problems and are prone to constant upset	Are rather poor accident and violation risks in spite of themselves	Group psychotherapy with some driver education appended
5	Have consistent tendencies to antisocial and asocial behavior	Chronic violators who may also have a high accident rate	Prognosis extremely unfavorable; screen from group and limit driving privileges
6	Miscellaneous (epileptics, diabetics, mental defectives, etc.)	Behavior unpredictable; driving record may range from very poor to very good	Each case highly individual as to diagnosis and treatment; in absence of knowledge of each case, screen and limit driving privileges

who need it the least and who produce the fewest of our avoidable accidents (*i. e.*, groups 1 and 2).

The so-called emotional technics that I would advocate are available and very much in use today. Tons of soap are successfully sold to women who listen to daytime radio and television serials. These programs involve themselves less with plot than with problems that are close to the feelings of most American housewives. Among other things they deal with love, adventure, excitement, and many things either denied to or desired by the average housewife. Thus she becomes strongly identified with each serial and is emotionally "softened up" for the onslaught of the commercial in much the same fashion that a naval task force softens up an enemy beach before making an amphibious landing. The same technics are used in selling to children, who, for example, are encouraged to identify with some TV hero and who watch avidly while that hero uses or advocates the sponsor's product.

Many years ago it was a common saying among politicians that "if you wave the flag and quote the Bible you can be elected to any office." Obviously, they recognized the value of the emotional approach in influencing behavior of the masses. The same principles have been applied in advertising, fund-raising campaigns, and other attempts to produce a specific pattern of behavior in the public.

Thus we have two approaches to bringing about changes in the driving behavior of the public. One is a personal contact procedure based upon psychotherapeutic principles of education, and the other is one of mass communication based on the emotions and feelings of the public. It is obvious that they should be used together in order to be most effective, and that any approach based upon persuasion by reason and logic alone must be considered to have minimal effectiveness.

The first method can best be used within limited groups, such as truck drivers, taxi drivers, and military units. This would involve the screening of the most likely candidates for such psychotherapy already in the group, and the screening of new applicants. Among the former, treatment need be applied only to those who hold the best promise of responding and who cannot be discharged or shifted to nondriving positions. Among the latter there would be no need for treatment since they would not be accepted into the group if it could be avoided.

The second method is not only applicable to the general public, but can also be tailored to suit particular segments of the population. Since it is possible to better know the personality characteristics of a delimited group, we can develop special forms of mass media (*e. g.*, literature, conferences, safety cam-

paigns, et cetera) that are better suited to the emotions and feelings of the subgroups they are designed to reach. In such a situation the two methods would be closely interwoven.

DISCUSSION

The technics I have outlined must await further planning and research before their details can be worked out. However, I believe that we now know enough to justify such an approach and that the basic principles of application are already available and ready for use. The development and testing of such an approach will require both funds and talent, both of which are in short supply. Also, once clinical psychologists and other specialists are assigned to this work they would require access to, and control over, large numbers of drivers. Such a situation is not available to most civilian agencies, but fortunately the military is able to offer these advantages to its researchers with practically no increase in present operating costs. Large Marine Corps and Army bases have thousands of men whose routine training duties make them sufficiently available to researchers so that the needed work can be carried out. During the period from 1953 to 1955 the Commandant of the Marine Corps and the Commanding Officer of Camp Lejeune were extremely co-operative and sympathetic to work in this field and, with a minimum of inconvenience and at no extra cost, were able to make available for research as many drivers of private vehicles as we could use.

Therefore, it would appear that the military, and especially the Department of the Navy, would be able to provide means for the development of a dynamic and increasingly effective program of highway safety that will be applicable to both military and civilian drivers. In such an event it can be expected that technics and methods will be forthcoming that will significantly lower the presently high rate of death and injury among our service personnel and at the same time offer new hope to our civilian colleagues.

SUMMARY

An outline of a new approach to the problem of highway accidents is based on the premise that the largest single factor operating in the production of motor vehicle accidents is the personality of the drivers. Six general groups can be defined. It is believed that our present knowledge has advanced to the point where we can begin to develop a program that will diagnose and treat drivers on the basis of their particular personality patterns, and the proper procedures would seem to be personal contact based on psychotherapeutic principles and mass communication based on the emotional interests of the public.

REFERENCES

1. *Accident Facts.* National Safety Council, Chicago, Ill., 1952.

2. McGuire, F. L.: Analysis of automobile accidents involving military personnel, NM 005 052.33.01. Naval Medical Field Research Laboratory, Camp Lejeune, N. C., June 1954.

3. Thorndike, R. L.: Human factor in accidents with special reference to aircraft accidents. Project No. 21-30-001. U. S. Air Force School of Aviation Medicine, Randolph Field, Tex., Feb. 1951.

4. McGuire, F. L.: Psychological comparison of accident-violation free and accident-incurring automobile drivers. NM 005 052.33.04. Naval Medical Field Research Laboratory, Camp Lejeune, N. C., Feb. 1955.

5. Tillman, W. A.: The Psychiatric and Social Approach to the Detection of Accident Prone Drivers. Thesis, University of Western Ontario, 1948.

THE DILEMMA

"The dilemma in which contemporary man of the West finds himself is unmistakable. Free societies recognize and favor individual differences. These are considered the sources of all progress. The center of gravity in free societies is the individual person. Society's function is to give maximum opportunity for self-expression and at the same time guard the members of society from infringing on one another's interest by insisting that everyone keep the accepted rules of the game. This type of system under favorable conditions, such as during the last 300 years of Western culture, through encouraging individual expression in the sciences, arts, and technology, can be highly productive. At the same time, because it accelerates social change and as a result complicates the problems of individual adjustments, it creates insecurity. Self-regulating mechanisms, such as the supply and demand principle in economics, no longer function smoothly, and the urge for central planning appears. Traditional value systems lose their categorical force and this throws individuals back to their own choices. This results in a flight from free choice and enterprise toward the security of steady jobs, preferably in large, depression-proof companies, or in state employment."

—FRANZ ALEXANDER, M. D.
in *American Journal of Psychiatry*
pp. 692-693, Mar. 1956

Clinicopathologic Conference

Fitzsimons Army Hospital, Denver, Colo.*

EARACHE AND VERTIGO

Summary of Clinical History. A 29-year-old carpenter entered the hospital on 24 December because of pain in the right ear of two and one-half months' duration and a discharge from the ear for two months.

The onset of pain in the right ear was accompanied by malaise, myalgia, anorexia, a low-grade fever, and weight loss. The patient consulted a private physician, who treated him with sulfonamides and penicillin without any apparent toxic effects. Five weeks prior to admission his physician performed a myringotomy with resultant drainage of a small amount of blood and pus for two days. About one month prior to admission the patient noticed some difficulty in swallowing, and this continued until the time of admission. Three weeks later the ear was again opened with drainage of a slight amount of pus for one week. Ten days before admission it was opened a third time with minimal drainage. During the time from the onset of his illness until admission to the hospital the patient's weight fell from 150 to 120 pounds.

On Christmas, the day following admission, the patient went home on leave and ate lightly because of anorexia. Shortly after eating he developed vertigo consisting of a lateral to-and-fro movement. He reported back to the hospital on 26 December.

Physical Examination. On 26 December, examination disclosed a chronically ill, undernourished white man about the stated age

*Maj. Gen. Martin E. Griffin, MC, USA, Commanding General. From the Pathology Service, Col. Howard A. Van Auken, MC, USA, Chief.

of 28 years. The caloric test showed slight depression on the right. There was an equivocal left nystagmus. The right ear drum was full and showed a slight bulge. There were no neurologic changes except for a slight unsteadiness on walking. A right Horner syndrome which had been present for about 48 hours was noted. Blood pressure was 120/80 mm Hg. There were no lesions of the skin. Examination of the heart, abdomen, and extremities was negative.

A roentgenogram of the chest on 26 December was reported as negative. Roentgenograms of the mastoid on 26 December showed acute inflammatory changes in the right mastoid region. The skull was otherwise normal. A subsequent roentgenogram of the mastoid on 14 January showed no change from the previous examination. Roentgenograms of the chest on 28 January, 8 March, and 29 March were negative.

Laboratory Studies. The only abnormal laboratory findings on admission were a white blood cell count of 13,500/μl with a normal differential, except that one differential showed 12 per cent eosinophils; however, several other hemograms were normal. The sedimentation rate went from 4 mm to 40 mm in February. Through January and February the urinalyses were normal, but on 1 March the urine specimens began to show casts and albumin. This persisted until the patient died. Shortly after the abnormal changes were noted the patient developed a hypertension from 170/100 to a peak of 190/130 mm Hg. Terminally, the systolic pressure began to decrease, going down to 140/130 mm Hg. The temperature, which was elevated from 100° to 102°F during the first month's hospitalization, gradually fell to 99.5°F during the last three months of the illness. The only other abnormal findings were an elevation of serum globulin to 4 g/100 ml with depression of the serum albumin to 2.7 g/100 ml with an albumin-globulin ratio of 0.7; initially the serum proteins and albumin-globulin ratio had been normal. Further laboratory studies included two spinal fluid examinations, 20 blood cultures, and numerous liver and kidney function tests. Blood chemistries at all times revealed normal CO_2 combining power, nonprotein nitrogen, urea nitrogen, sodium, potassium, chloride, calcium, and phosphorus. No biopsy specimens were taken from muscles or liver.

Course in Hospital. Roentgenograms on admission showed an acute inflammation of the right mastoid. It was the opinion of the examiner that the symptoms were toxic manifestations of the mastoiditis, and that extension to the central nervous system by contiguity had not occurred. The diagnosis on admission was acute mastoiditis, right, suppurative, moderately severe, with possible episodes of labyrinthitis and toxic neurologic manifestations. The patient was treated with penicillin with some subsidence of the otalgia, malaise, fever, and neurologic symptoms.

On 8 January, however, he developed numbness of the left hand. Examination showed a slight hypesthesia, but pain sensation was intact. There was slight generalized muscular weakness of the left upper extremity with definite loss of apposition of the thumb and fingers. Within a day there was a similar involvement of the right hand, and a few days later both lower extremities were similarly affected. At that time the patient was seen by the neurologic consultant and diagnosed as having a peripheral polyneuritis on a toxic basis.

On 16 January he developed an irregular hemorrhagic area on the index finger of the right hand. During this time the patient developed a migratory polyarthritis of the knees, ankles, and joints of the upper extremities. Two days later he developed redness of the left eye, which was diagnosed as an iridocyclitis by the Eye Department. From that time the patient had a steady progressive downhill course with increasing severity of the peripheral polyneuritis. The deep reflexes continued to decrease until finally the ankle reflexes were entirely absent. The muscular paralysis became more pronounced and the patient became unable to feed himself or do anything more than turn over in bed. He continued to show a steady, progressive weight loss.

The patient's skin appeared tanned, but he stated that his skin had been this color all his life and that there was no increase in pigmentation. At no time did he show any peripheral edema, although examination of the eyegrounds following development of the hypertension revealed blurring of the disk margin and tortuosity of the vessels with an increase in the light reflex. Several electrocardiograms showed a notched T wave in leads V_2 and V_4. The patient gradually became very emaciated, dropping from a normal weight of 150 to 65 pounds terminally. At all times there was extreme weakness of the muscles and burning pain in all extremities. The last 10 days he developed moist rales throughout the lungs. At 1840 hours on 10 April, approximately 6 months after the onset of the disease, the patient quietly died.

The treatment in this case was purely empiric. The patient was given massive doses of vitamins parenterally; several courses of penicillin were administered, and blood transfusions were given on three occasions. Physiotherapy was instituted at the onset of the illness, but finally had to be discontinued because of the paresthesias. Papaverine hydrochloride was given parenterally, but had to be discontinued because of the pain associated with this and other parenteral therapy.

DISCUSSION

Doctor Auld:* Doctor Sheedy, will you discuss the differential diagnosis, please?

*Maj. David Auld, USAF (MC), Senior Resident in Pathology.

392347 O - 56 - 6

Doctor Sheedy:* This patient became ill in September with pain in the region of the right ear, apparently an infectious process which perforated the drum. In retrospect he had malaise, myalgia, anorexia, low-grade fever, and weight loss. These are generalized symptoms that are nonspecific and unusual in an ear infection. That this was probably purulent is borne out by sulfa and penicillin which was given. He improved, but the process recurred in November, and at this time a myringotomy was done with evacuation of pus and blood. In December he had dysphagia. Could the dysphagia be the result of infection in the throat or is it indicative, in terms of the subsequent course, of some type of nervous system involvement? We don't know; it doesn't appear again in the protocol.

In December the patient had a second and a third myringotomy with pus again being obtained. During this period the patient lost 30 pounds in weight. Now this is considerable for what was an otherwise ordinary infection in the ear. This completes the first of three periods in this patient's course. He apparently was quite sick at that time and was admitted to the hospital for further investigation, and so begins his second phase.

At the time he came in, another group of symptoms are prominently mentioned and these all seem to be related to the nervous system and the gastro-intestinal tract. He had anorexia, lateral vertigo, and unsteady gait. People with vertigo can have disease of the labyrinth of the ear, vestibular nerve damage, or cerebellar or other types of brain disease. Findings of his physical examination were consistent with those in a severely ill patient. A caloric test was depressed on the right. Depression I assume indicates a positive test, and it would seem to implicate the ear, or at least the labyrinth, although again we can't say that dogmatically. He had questionable nystagmus to the left, but was the fast component to the left or to the right? While questionable and difficult to interpret it implies some type of cerebellar difficulty. He obviously had an ear infection. Has the infection now progressed to thrombosis of one of the important veins, or has the infectious process directly involved the brain? I don't believe that the latter is the case because there is no mention of localizing signs or meningismus, and subsequently two spinal taps were normal.

The patient also had a right Horner's syndrome and again this is difficult to localize. A Horner's syndrome can be due to many things: involvement of the brainstem itself, of the spinal cord, or particularly of the cervical sympathetics by a tumor, cervical rib, infection, or trauma. Pulmonary disease such as lung tumors has been known to cause this manifestation. His chest film was essentially negative, which would seem to rule out most of these causes, and so we are unable to state whether he has a cord or brain lesion. We are not given sufficient information, therefore, to make a neurologic differentiation. It is probable that this patient did have some type of brain damage.

*Lt. Col. John A. Sheedy, MC, USA, Chief, General Medicine Service.

Could we say that the dysphagia might be associated with 9th and 10th nerve damage, further supporting a process in the brain?

The roentgenogram of the mastoid region did confirm the presence of a significant infection at that time. The urine is said to be negative. The white blood cell count was 13,500/μl on admission, and that is the only one of which we are told specifically. This, I believe, represents leukocytosis. The differential was not remarkable except for the presence of a 12 per cent eosinophilia, and this is a very significant point. I will mention the reason why later.

The patient was given the obvious treatment for his infection—penicillin—and he improved. In January he developed numbness in the left hand—slight hypesthesia with pain sense intact. Also there was noted to be generalized muscular weakness in the left arm and loss of the ability to oppose the thumb and fingers. There are a number of things that we might consider at this point. In syringomyelia the pain sense usually is one of the first things to be lost. A toxic polyneuritis could be considered and certainly seems to best fit the picture. Multiple sclerosis would have to be entertained to explain an otherwise confusing syndrome. Infectious polyradiculitis usually doesn't begin in the hands, but is a possibility. Apparently, there was some sensory involvement and definite motor involvement, but I don't believe we can exactly state the cause. On the next day the patient had similar findings in the right hand and on the following day, 10 January, both legs were involved. A neurologist thought that this was confusing and rendered the rather noncommittal diagnosis of polyneuritis on a toxic basis which would seem to be the only one that would be justifiable under the circumstances.

On 14 January another roentgenogram of the mastoid showed no remarkable changes. On 16 January a new problem had arisen—a hemorrhage in the right index finger. The hemorrhage I assume to be of the subcutaneous type and therefore consistent with purpura. At this time he also developed migratory polyarthritis involving the knees, ankles, and upper extremities. Could the hemorrhage be the result of thrombocytopenia or other bleeding disorder? There is no family history of hemophilia or other bleeding disorder. It is true that thrombocytopenia can be acquired and that the patient was on sulfa, which might suggest such a possibility. What about polyarthritis? This is a term frequently used in connection with rheumatic fever and rheumatoid arthritis. This patient did not have heart disease or a history of it, and neither on admission nor subsequently was any significant heart lesion found. I don't feel that we can implicate rheumatic fever. Any patient with an infectious process of streptococcal origin might, after two to three weeks, develop this entity. Could this be rheumatoid arthritis? He is within the age group, but without more description of his condition, this entity must remain only a possibility.

Now on 18 January the eye was involved by an inflammatory process, and I won't remark further about it except that it involves an additional

organ system. His neuritis was known to become worse, and at this time he had absent reflexes and, presumably, was more or less paralyzed. His weight loss progressed. On 28 January a repeat chest film was negative; during the month of February urinalyses were repeatedly negative and sedimentation rates varied from 4 to 50 mm.

In March, he entered his third and final phase of illness, and during this period we again see a change in the over-all clinical course, with new organ systems being added to the picture. Examination of the urine now showed casts, albumin, and red cells. Could this be an extension of a rheumatoid or rheumatic state, or does this imply renal disease itself? Certainly glomerulonephritis would be such a possibility, as would pyelonephritis. He did not have azotemia. He did have an elevated blood pressure on several occasions; in fact, it reached 190/130 mm Hg, which was within the limits of the very severe, malignant type and was accompanied by blurring of the optic disks and increased tortuosity of the vessels in the eyegrounds. Such a phenomenon is not uncommon in acute nephritis, and the blood pressure is frequently elevated. We cannot further classify the renal lesion except to include it as another system involved in this patient's illness.

His temperature was almost constantly elevated, from 100° to 102°F. Now if this patient had a murmur with the fever, we would have to consider subacute bacterial endocarditis. We are not told that he ever had a murmur. At any rate, the physicians who were taking care of him thought of this possibility because they obtained 20 blood cultures, all of which were negative. I don't believe that this patient's problem was one of uncontrollable bacteremia. The globulin was 4 g/100 ml with an albumin of 2.7 g/100 ml. This low albumin could result from loss through the urinary tract or poor nutritional intake. He was anorectic and he had a severe catabolic disease. Could this have been the result of some type of liver disease? We are told that his liver profile was normal, but on the other hand the liver is the site of manufacture of albumin and not necessarily of globulin. A reduction in albumin to this degree could very well implicate the liver as being a part of his total disease. We cannot exclude the contributory aspects of loss through the urinary tract or a poor nutritional status. Renal function tests were otherwise negative and are of no help to us. That for CO_2 was normal as were those for sodium, potassium, chlorides, calcium, and phosphorus. Frequently in the presence of renal disease low calcium, elevated phosphorus, and acidosis are seen.

An electrocardiogram showed notching of the T waves in leads V_2 and V_4. This is a nonspecific sort of response and doesn't tell us much. It might imply that he had some vague or disseminated disease of the myocardium but otherwise is not diagnostic. It is stated very prominently that the skin was tan but that the patient was of a dark complexion. The skin is important here for several reasons. Did this tanning reflect vitamin deficiency? Did it reflect some involvement of the adrenal such as is frequently seen in Addison's disease? He did

not have any abnormality of sodium or potassium or chlorides and no hypotension, except terminally. There was no evidence of adrenal cortical deficiency. The other point that I want to make is that the skin, except for the hemorrhage mentioned previously, did not show any nodules, rashes, or anything else that could help us, either positively or negatively.

The patient continued to lose weight and he continued to go downhill. During the final portion of March another chest film was normal. It is interesting that the heart size apparently was normal in the presence of such a hypertension. During the month of April the patient had some type of pulmonary difficulty. Could it be involvement by some diffuse disease such as this patient appears to have had, or was this merely the terminal insult in a very cachectic patient? The patient may very well have had a pneumonitis, and I believe that the pulmonary disease occurred in the agonal phase of his illness.

In summary, we have a 29-year-old patient who had multiple system disease. He had involvement of the ear, nervous system, joints, skin, eye, kidney, cardiovascular system, and, questionably, the liver and the lungs. In an exercise such as this it is rather unpopular to make multiple major diagnoses. To explain such multiplicity, a collagen disease is suggested. Logue and Mullins,[1] in the 177 cases which they analyzed, reported the percentage incidence of the various manifestations of periarteritis nodosa. Of these manifestations, this patient had fever, leukocytosis, albuminuria, hypertension, neuritis, a rapid onset, weakness, weight loss, dyspnea, cough, emaciation, sensory involvement, arthritis, eosinophilia, purpura, central nervous system involvement, muscular soreness, visual disturbance, nausea, atrophy, and vertigo. There were very few other manifestations which our patient missed.

Zeek[2] has spent considerable time reviewing the historical aspects of this particular disease. She stated that the disease itself has been divided into three periods of progression or periods of study. It was originally described by Kussmaul and Maier[3] in 1866, and from the period 1866 to 1900 primary emphasis was on the pathologic demonstration of various organs involved. From 1900 to 1925, medicine generally was in the era of the search for focal infection, and this disease was subject to intensive investigation, but no causative agent could be demonstrated. From 1925 to the present time investigators have been busy in demonstrating various hypersensitivities or allergic causes for diseases, and this entity seems to fit, at least in the minds of many people, in this category.

It is interesting that the disease has been compared with many conditions, such as hypersensitivity angiitis, allergic granulomatous angiitis, rheumatic arteritis, and temporal arteritis, to mention but a few of the various conditions. In Kussmaul and Maier's original description symptoms such as chlorotic marasmus, polyneuritis, polymyositis, and

abdominal symptoms were enumerated as being characteristic of this entity.

Since this patient's illness began in the ear and since the neurologic aspects were a prominent part, I would like to review some of the work reported by McNeil, Burke, and Reingold.[4] Involvement of the nervous system is a well-known phenomenon in this disease. Lovshin and Kernohan[5] studied 29 cases and found that peripheral neuritis occurred at some time in the course of illness in 52 per cent of their patients. This was predominantly of the motor type, although sensory findings were also commonly seen. They felt that this was the result of occlusion of nutrient arteries and not due to the presence of some unknown toxin or other pathologic agent. The central nervous system was involved in 20 per cent of 300 cases reported by Foster and Malamud.[6] Nerve deafness was present in two of their individuals. Parker and Kernohan[7] also studied 16 cases at autopsy who had central nervous system involvement and demonstrated arterial lesions in 69 per cent.

Now I don't think that there is any other collagen disease which would give you the picture that this patient presented. We might mention lupus erythematosus disseminata, but the patient had no typical skin lesions. This disease is more common in females than in males, whereas periarteritis nodosa is more common in males; also, hypertension, although seen in terminal cases, is rather uncommon in lupus, and joint manifestations are more frequent. I admit that I can't rule out lupus entirely, but I think that the weight of evidence is certainly consistent with the fact that this patient had periarteritis nodosa with involvement of the systems as listed.

Dr. Sheedy's diagnosis:
Periarteritis nodosa

PATHOLOGIC FINDINGS

Doctor Auld: The external examination revealed an emaciated and dehydrated adult white man measuring 65 inches and weighing 66 pounds. On opening the chest the lungs were found to be wet and dark reddish-purple, and frothy fluid could be expressed from the cut surface. The heart was globular and weighed 270 grams, and the walls and papillary muscles were hypertrophied. The kidneys were scarred, and on cut section numerous areas of infarction could be found in both kidneys. A hemorrhagic cystic structure was found in the right testis and three or four were found in the left (fig. 1). The gastro-intestinal tract was most striking, and a number of small nodules could be found along the course of the mesenteric vessels and in the serosa (fig. 2). A hemorrhagic cavity measuring 2 by 3 cm was found in the right cerebrum just lateral to the lateral thalamic nucleus (fig. 3). Microscopic examination revealed a picture of subacute and chronic polyarteritis nodosa. The medium-sized vessels were involved in the heart, pancreas, adrenals, kidneys, prostate, testes, esophagus, stomach, mesentery, peripheral nerves, muscles, and fascia. A great deal of healing had

occurred, and in many places recanalization of the vessels was seen. A number of small aneurysms were found along the mesenteric arteries (fig. 4).

Figure 1. Cut sections of testes revealing large hemorrhagic areas.

Figure 2. Section of ileum and attached mesentery, showing distribution of nodules along the mesenteric arteries.

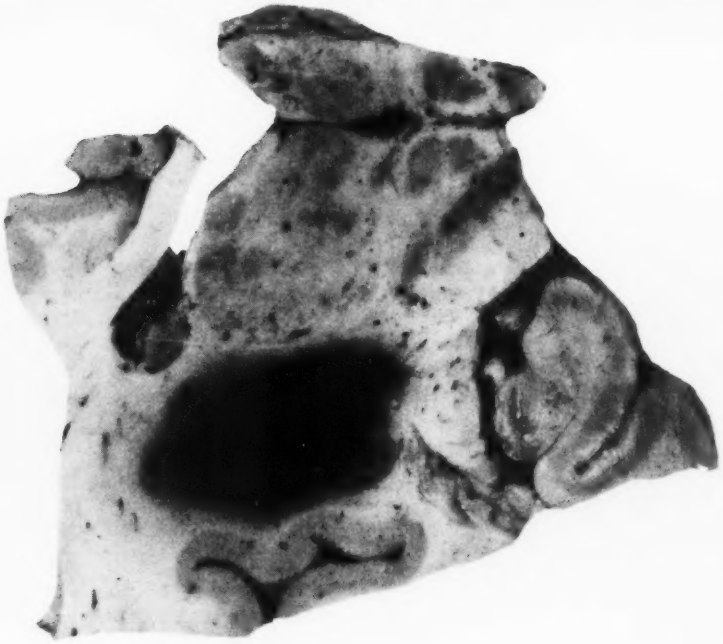


Figure 3. Section of right cerebrum at level of lateral thalamic nucleus, showing hemorrhage.

Polyarteritis nodosa is a generalized vascular disorder, one of the collagen diseases. The etiology of this condition is obscure, although recent studies have shown that hypersensitivity plays a large part. The microscopic pathology of polyarteritis is very similar to that of serum sickness, and it is felt by some that the two are identical or closely related, the latter being a mild form of the former. Both diseases have been seen following serotherapy in which serum in doses of 100 cc or more was used. A number of cases were reported with the advent of the sulfonamide era, and it has been fairly conclusively proven that foreign serum, sulfonamides, and other noxious agents have produced the disease.

All the collagen diseases have a similar basic morbid pattern. The beginning stage is increased production of connective tissue ground substance which is indicative of a disturbed activity of fibroblasts. In the severe or acute stages, fibrinoid degeneration and necrosis occur due to the precipitation of acid mucopolysaccharides with fibrinogen. In later stages there is a proliferation of fibroblasts with the appearance of large numbers of plasma cells, and in the chronic stages there is sclerosis with or without hyalinosis. Plasma cell proliferation and the concomitant elevation of gamma globulin appear to be factors in

the pathogenesis of this group of diseases. Experiments have shown that many of these diseases are characterized by a hypersensitivity diathesis; tremendous titers are obtained upon injection of foreign

Figure 4. Photomicrograph of aneurysm in mesenteric artery. (× 10)

antigen, and it has been suggested that the collagen diseases may be spoken of as dysgamma-globulinemias.

The highest incidence of polyarteritis is between the ages of 20 to 40 years, and the ratio of affected males to females varies from 3 or 4 to 1. The disease mainly affects the small arteries and arterioles, but occasionally also affects the veins. It has been reported that the kidneys are involved in 87 per cent of the cases, the heart in 84 per cent, the liver in 71 per cent, the spleen in 31 per cent, and the lungs in 25 per cent. Histologically the lesions are divided into four stages:

1. *The degenerative stage,* in which there is fibrinoid degeneration of the intima and media. Complications of this stage are miliary aneurysms which may rupture and give rise to the hemorrhage frequently seen.

2. *The inflammatory stage,* in which the necrotic area and adventitia are densely infiltrated with polymorphonuclears, eosinophils, and sometimes lymphocytes and plasma cells. The infiltrate extends into the perivascular tissues, and the lumina of such vessels are not infrequently thrombosed.

3. *The granulation stage,* in which the necrotic portion of the vessels is replaced by granulation tissue. There is intimal proliferation with partial or total occlusion of the vessel.

4. *The fibrotic stage,* in which the destroyed vascular wall is replaced by scar tissue. The lumen may be reduced in size, obliterated, or recanalized.

Complications of the disease are aneurysmal dilatations of the vessels with rupture and hemorrhage, and thrombosis with infarcts. All stages may be found in one case of the disease, as exacerbations and remissions are frequently seen. The disease was at first thought to be uniformly fatal, but the recent literature indicates that many mild cases were heretofore probably unrecognized as such, and that histologically proven cases have apparently become cured.

Pathologic diagnoses:

Periarteritis nodosa, generalized, subacute stage, involving heart, pancreas, adrenals, kidneys, prostate, testes, esophagus, stomach, mesentery, peripheral nerves, muscles, fascia, and brain.

Bronchopneumonia, right and left lungs, due to *Staphylococcus aureus, Streptococcus viridans,* and *Hemophilus parainfluenzae*

Doctor Scherr:* One thing that somewhat puzzled me was that there was not too much stress placed upon the etiology of this particular condition. What would we call this if the patient had lived? This is

*Capt. Merle A. Scherr, Chief, Allergy Section.

important because the allergy literature as well as the neurologic literature has contained a number of articles concerning this type of neurologic reaction in patients who had received penicillin as well as sulfonamides. In the older days, as was pointed out earlier, stress was placed upon horse "serum sickness" as a cause of this contion; however, I don't believe we see as much serum sickness now as we did in the past because of the use of toxoid, modern antibiotics, and chemotherapeutic drugs.

The emphasis placed upon the neurologic complications of drug reactions, particularly penicillin, has attracted much attention. These changes may involve the brain, the meninges, the nerve groups, or the nerves themselves, either singly or multiply (that is, the single neuritic lesion or the polyneuritic lesion). While any or all of these structures may be affected simultaneously, neuritis of the peripheral nerves and consequent paralysis is probably the most common syndrome. Males, particularly between 20 and 40 years, are most often affected. Penicillin given prophylactically is perhaps responsible, according to the literature, for more than half of the reported cases. The neurologic complications come on as a rule, after the onset of the other symptoms of so-called "serum sickness." I use the term serum sickness to denote symptoms rather than the cause being horse serum or one of the other related sera.

For some unexplained reason, the condition usually brings about the characteristic Erb-Duchenne scapulohumeral paralysis. In the neuritic type, the patient usually complains of severe pain involving the neck, shoulders, arms, and legs. This is followed within a few hours or longer by flaccid paralysis and subsequently by gradual atrophy of the muscles. Muscle tenderness, dull pains, and hyperesthesia persist for several weeks. Recovery, when it occurs, and usually it does occur, while sometimes slow, usually is complete within about six months. If these patients go on to death, one will usually find polyarteritis or periarteritis nodosa.

In the cases which have lived, unfortunately not too much study has been directed toward the true condition, and there are not too many pathologic specimens to prove or disprove the presence of polyarteritis. There are two very good articles[8,9] worth looking at in this respect. These authors particularly point out that one must be on the lookout for the various obscure manifestations of penicillin allergy. Most commonly, these will be (1) urticaria, (2) dermatitis medicamentosa, (3) erythema nodosum, (4) erythema multiforme, (5) contact dermatitis, (6) exfoliating dermatitis, (7) bullous dermatitis, (8) the so-called true serum sickness reaction with polyarthritis, fever, et cetera, (9) purpura, (10) agranulocytosis, (11) photosensitivity, (12) lupus erythematosus, (13) periarteritis nodosa, (14) anaphylaxis (which is the acute anaphylactic-type shock), and (15) miscellaneous conditions such as convulsions, peripheral neuritis, et cetera, such as I have mentioned. This should indicate the importance of drug reactions, particularly to

penicillin, which should certainly be kept in everyone's mind. Such a reaction was quite possibly the cause in this case.

REFERENCES

1. Logue, R. B., and Mullins, F.: Polyarteritis nodosa; report of 11 cases with review of recent literature. *Ann. Int. Med.* 24: 11-26, Jan. 1946.

2. Zeek, P. M.: Periarteritis nodosa; critical review. *Am. J. Clin. Path.* 22: 777-790, Aug. 1952.

3. Kussmaul, A., and Maier, R.: Ueber eine bishir nicht beschriebene eigenthumliche Arterienerkrankung (Periarteritis nodosa), die mit Morbus Brightii und rapid fortschreitender allgemeiner Muskellahmung einhergeht. *Deutsches Arch. f. klin. Med.* 1: 484-517, 1866.

4. McNeil, N. F.; Burke, N.; and Reingold, R. M.; Periarteritis nodosa causing deafness in adult; report of case with special reference to concepts about the disease. *Ann. Int. Med.* 37: 1253-1267, Dec. 1952.

5. Lovshin, L. L., and Kernohan, J. W.: Peripheral neuritis in periarteritis nodosa; clinicopathologic study. *Proc. Staff Meet., Mayo Clin.* 24: 48-52, Jan. 19, 1949.

6. Foster, D. B., and Malamud, N.: Periarteritis nodosa; clinico-pathologic report with special reference to central nervous system; preliminary report. *Univ. Hosp. Bull., Ann Arbor* 7: 102-104, Dec. 1941.

7. Parker, H. L., and Kernohan, J. W.: Central nervous system in periarteritis nodosa. *Proc. Staff Meet., Mayo Clin.* 24: 43-48, Jan. 19, 1949.

8. Park, A. M., and Richardson, J. C.: Cerebral complications of serum sickness. *Neurology* 3: 277-283, Apr. 1953.

9. Kern, R. A., and Wimberley, N. A., Jr.: Penicillin reactions; their nature, growing importance, recognition, management, and prevention. *Am. J. M. Sc.* 226: 357-375, Oct. 1953.

HAZARDS IN THE USE OF ANTIBIOTICS

Antibiotic therapy is no longer a simple matter. The doctor in his choice of an antibiotic now must accept a calculated risk in terms of the benefit which may accrue to the patient and toxic sequelae which may develop. The indiscriminate use of a relatively nontoxic drug, such as penicillin, is no longer to be condoned. In his selection of an antibiotic the physician must take into account the possibility that the condition may be caused by an organism not susceptible to the antibiotic. Further, there is the inherent risk of drug toxicity and the possibility that a sensitivity reaction may occur, or more pertinent, that the patient may be sensitized so that he will be denied the benefits of the antibiotic at a later date.

—F. B. RODMAN, Ph. D., M. D.
in *Canadian Medical Association Journal*
p. 638, June 1954

ARMY LABORATORY RESEARCH IN TUBERCULOSIS

ARTHUR F. LINCOLN, *Lieutenant Colonel, MC, USA*

SINCE World War II the introduction of such antituberculous drugs as streptomycin sulfate, para-aminosalicylic acid (PAS) and isoniazid (isonicotinic acid hydrazide) has greatly facilitated the treatment of patients with tuberculosis. With the transfer of many patients with early disease and nearly all with long-standing chronic disease to Veterans Administration hospitals, tuberculosis is not as great a military medical problem as it was in the past, although the incidence of new cases has not dropped appreciably. However, in many strategic areas, tuberculosis is still the major problem in infectious diseases. General mobilization or any increase in numbers of the military forces required in these areas with a high incidence rate would directly increase tuberculosis in the Armed Forces. The Army's peacetime mission is to prepare for war; thus, it is believed advisable to continue and stress research in the field of tuberculosis where many problems in the treatment and mechanisms of the disease remain unanswered.

IMPORTANCE OF THE RESEARCH LABORATORY

As with any infectious disease, the success of a clinical research program in tuberculosis is almost totally dependent on the laboratory supporting it. Thus, the research laboratory becomes the keystone in the investigations of the therapy of the disease, the metabolism of the causative agent, and the host response to both. The current clinical emphasis is directed toward re-establishing host-parasite equilibrium by successful drug therapy. The research laboratory's responsibility in these studies is directed toward indicating the drug, or the combination of drugs, which will bring about the successful resolution of the disease. Facets of the supportive laboratory studies necessarily include an in vitro evaluation of each antituberculous drug being used, the evaluation of the drug dosage which will bring about a therapeutic response, and a study of any toxic reaction which may occur in the patient as a direct result of the use of the drug or drugs.

From Fitzsimons Army Hospital, Denver, Colo.

The research laboratory is responsible for recovering *Mycobacterium tuberculosis* from the patients under drug therapy, and in determining the behavior of the organisms in the presence of the antituberculous agent, or agents, which are being administered. If, after appropriate intervals of drug therapy, it is still possible to recover viable *Myco. tuberculosis* from the treated patient, then it must be assumed that the specific chemotherapy employed is not adequate for that specific patient and that one of several things must have taken place: (1) It is possible that the organisms recovered are drug-resistant mutants which have developed in the presence of the antituberculous agents being used. (2) It may be that the dosage of the drugs used was inadequate to effect blood and tissue concentrations sufficient to eliminate the *Myco. tuberculosis* from the treated patient. (3) Although the serum drug level may have been adequate, little or no drug may have reached the disease-causing bacilli because of pathologic conditions at the site of the lesions. (4) It is possible that the drug dosage that was administered to the patient under study, though effective in most persons, may have been altered by metabolism to inactive derivatives.

Therefore, during the period in which the effects of specific drugs on the *Myco. tuberculosis* are being studied, serum concentrations of the antituberculous agents being administered to the patient are determined. At the same time that laboratory studies for the clinical evaluation of drug therapy are conducted, more fundamental investigations on the effects of specific antituberculous agents on *Myco. tuberculosis* are under way. Studies of this nature that have been conducted during the past several years, both in the research and development unit of this hospital and in other research laboratories, have brought to light significant facts related to the chemotherapy of tuberculosis.

ISONIAZID

One of the significant discoveries, with respect to the antituberculous drug, isoniazid, is the unique way in which most mutants of *Myco. tuberculosis* which are selectively resistant to this drug are altered in their ability to cause progressive tuberculosis in normally susceptible laboratory animals, *i. e.*, the guinea pig, certain strains of mice,[1] and the Rhesus monkey.[2] Middlebrook[3] and Neumayr, Morse, and Morse[4] reported that concurrent with resistance to isoniazid and the loss of the ability to cause progressive disease in experimental animals, the metabolism of these microbes has been altered to the extent that certain processes normal to native isoniazid-susceptible *Myco. tuberculosis* are no longer fully active; *i. e.*, the activity of the endogenous enzyme catalase is either diminished or absent in isoniazid-resistant mutants of *Myco. tuberculosis*. The extent of alteration of the metabolism of these microbes seems to be direct-

ly related to the concentration to which these mutants are resistant to isoniazid.

One must not lose sight of the fact that the primary object of drug therapy is to aid in the elimination of the *Myco. tuberculosis* from the infected patient. Because the eradication of the bacilli from the patient may be impossible, then it may be desirable to render the remaining infecting organisms resistant to high concentrations of isoniazid, thus taking advantage of the fact that if isoniazid resistance is high, the surviving organisms may no longer cause a progression of the disease in these persons.

To accomplish either the eradication of most of the *Myco. tuberculosis* from the infected person, or to eliminate all but bacilli resistant to high levels of isoniazid, requires that adequate serum drug concentrations be established and maintained.

ISONIAZID SERUM CONCENTRATION

Numerous investigative groups have reported the results of serum "isoniazid" concentrations determined by a chemical method.[5] The results obtained by this method indicate adequate serum isoniazid levels were being obtained, yet patients under study still excrete isoniazid-susceptible *Myco. tuberculosis* in their sputa, a fact which leads one to conclude that the organisms are not being reached by a biologically active drug. In support of this hypothesis, Hughes[6] has reported that from 40 to 60 per cent of the isoniazid administered to human beings is metabolized to an inactive acetyl derivative. (Other biologically inactive derivatives of isoniazid are formed but the principal one is reported to be the acetyl derivative.)

The research and development service of this hospital began a study of isoniazid serum levels by comparing the results obtained from applying two methods of analysis; the first, the commonly used Kelly and Poet chemical procedure,[5] and the second, a microbiologic assay procedure which measures only the isoniazid which is active against *Myco. tuberculosis*—free isoniazid. From the results of this work it was found that the values obtained by the chemical procedure differed markedly from the values obtained by the biologic assay method. Indeed, it was determined that patients receiving the usual drug dosage of from 3 to 5 mg of isoniazid per kilogram body weight per day obtained exceedingly small serum concentrations of this drug in its biologically active form. In studies in which volunteer patients received two to three times this concentration of isoniazid, it was found that in the serum of from 20 to 30 per cent of these persons there was little or no biologically active isoniazid present at any time after oral administration of the drug.[7] It was assumed that the discrepancy between the results determined chemically and biologically was due to the fact that the chemical pro-

cedure does not distinguish between free biologically active isoniazid and its acetyl derivative.

What to do about the situation? Obviously, more isoniazid must be given to patients to affect adequate biologically active drug serum levels. Can this be accomplished? In the past, the administration of more than from 300 to 400 mg of isoniazid daily in most patients was followed by the development of toxic neurologic reactions. However, it was shown by Biehl and Vilter[8] that increased concentrations of isoniazid could be safely obtained if, simultaneously, pyridoxine hydrochloride was administered. The simultaneous administration of pyridoxine hydrochloride with isoniazid prevented the development of the untoward toxic reactions to isoniazid. Concomitant with 100 mg of pyridoxine per day, it is now possible to administer isoniazid in concentrations up to 20 mg per kilogram body weight per day to most patients with tuberculosis without causing toxic side effects. However, a small number of patients receiving as much as 20 mg of isoniazid per kilogram per day still retain the ability to alter the biologic activity of this drug by means of metabolism. In answer to this problem studies were undertaken in the research and development laboratory at this hospital to find methods to decrease the metabolism of isoniazid, principally the acetylating mechanism.

METHODS TO DECREASE METABOLISM OF ISONIAZID

There were two approaches to this problem. The first was to provide an additional substrate which would compete for acetylization by being acetylated itself. The second was to block the acetylization mechanism with an appropriate agent.

Acetylization of isoniazid occurs on the amino nitrogen group of the hydrazine portion of the molecule. Other amino group-containing compounds are also subject to acetylization. With this fact in mind, studies were organized to test the acetylization competitive effect through the simultaneous administration of compounds which may be acetylated. The sulfa drugs and para-aminosalicylic acid (PAS) are compounds whose structure indicates that they should be subject to acetylization. Thus, if acetylization of isoniazid could be reduced by competition it would be possible to elevate the biologically active serum levels of isoniazid. It was found by Morse and co-workers[9] that the use of PAS, 12 grams per day with adequate doses of isoniazid, significantly elevated the free active isoniazid serum concentration. The Veterans Administration-Army-Navy cooperative study subsequently indicated the antituberculous chemotherapy regimen of isoniazid and PAS to be superior to all other drugs, or combination of drugs, now commonly used in the therapy of tuberculosis.[10]

The approach to blocking acetylization of isoniazid was by use of the compound, Pyrazinamide (brand of pyrazinoicacid amide). Pyrazinamide had been used in limited clinical trials in tuberculous patients for the past several years. It had been reported by several clinical groups that the combined use of isoniazid and Pyrazinamide in the treatment of tuberculosis was far superior to any other combination of antituberculous drugs. Yet, it was impossible to consistently measure in vitro the activity of this drug against the *Myco. tuberculosis*. It was found, too, that Pyrazinamide exhibited a toxic effect on the liver of some patients.[11] In evaluating the reports of the combined use of isoniazid and Pyrazinamide, it was theorized that the possible mechanism of action of Pyrazinamide was simply to inhibit the acetylization of isoniazid, the hepatotoxic effect of Pyrazinamide being responsible for an inhibition of the acetylating mechanism. With this hypothesis in mind, experiments were devised to evaluate the possibility. The results of the effects of Pyrazinamide on the acetylization of isoniazid reported by Perry and Morse[12] were rewarding, because of the discovery of a unique relationship which existed between *Myco. tuberculosis,* isoniazid, and Pyrazinamide. Certain isoniazid-resistant mutants of *Myco. tuberculosis* are susceptible to the in vitro antituberculous effect of Pyrazinamide. Mutants of *Myco. tuberculosis* resistant to approximately 4 and 15 μg of isoniazid are susceptible to low concentrations of Pyrazinamide. *Myco. tuberculosis* susceptible to isoniazid, or resistant up to 4μg of isoniazid, are resistant to high concentrations of Pyrazinamide and, likewise, bacilli resistant to more than 15 μg of isoniazid are also resistant to high concentrations of Pyrazinamide.

In certain patients, then, in whom it is impossible to significantly reduce the numbers of *Myco. tuberculosis* by combined drug therapy with isoniazid, streptomycin sulfate, and/or PAS (should the bacillary population be determined to be resistant to isoniazid between the critical concentrations of approximately 4 to 15 μg/ml medium) isoniazid and Pyrazinamide may be successfully used.

The utilization of isoniazid-Pyrazinamide combined drug therapy must be scientifically approached. First, the *Myco. tuberculosis* being excreted by the patient in question must be analyzed as to their level of resistance to isoniazid, and, if it is found that they are initially resistant to a concentration of isoniazid which brings them within the critical limits of the in vitro susceptibility to Pyrazinamide, this drug may be added to the therapy regimen. If, however, it is determined that the mutants of *Myco. tuberculosis* from the specific patients are either susceptible, or resistant to only low levels of isoniazid, and therefore resistant to Pyrazinamide, then the patient must be given increased

392347 O - 56 - 7

dosages of isoniazid sufficient to effect an elimination of those bacilli which are not within the Pyrazinamide-susceptible range and leave only those that are within the susceptible range. If this can be accomplished it may well be possible that many of the so-called treatment failure cases may be adequately controlled by the appropriate use of these two antituberculous drugs. In addition to assaying the microbial population which still reside in these so-called treatment failure patients, it becomes equally important to determine the patient's metabolism of isoniazid, for, if these patients are highly active metabolizers of isoniazid, even though this drug is being administered in large doses, it may be impossible to select the remaining viable bacilli in the patient resistant to the concentrations of isoniazid which will render them susceptible to Pyrazinamide.

The importance of the chemotherapy of tuberculosis has made drug-susceptibility testing in the bacteriology laboratory as important as any other single factor in the management of tuberculosis in human beings.

ADEQUATE GROWTH MEDIUM ESSENTIAL

The first essential for isolation and drug-susceptibility testing is an adequate growth medium. Since the discovery of the causative agent of tuberculosis by Robert Koch in 1882, many isolation and drug-susceptibility media have been developed and improved upon. However, the growth rate of *Myco. tuberculosis* on these media is slow, a factor which has resulted in a considerable delay in providing laboratory confirmation of the clinical diagnosis, and in providing drug-susceptibility-resistance data.

Factors complicating the collection of precise data are: (1) Many strains of isoniazid-resistant *Myco. tuberculosis* either fail to grow, or grow very slowly, on conventional isolation and drug-containing media.[13,14] (2) Because of the huge inocula commonly used in the relatively crude technics employed in inoculating drug-containing slants for susceptibility or resistance determinations, the data derived are of little qualitative or quantitative significance and fail to give a clinically reliable picture of the resistant and susceptible bacterial populations being excreted by the patient.

DETERMINATION OF SUSCEPTIBILITY

The technics of determining drug susceptibility and resistance of *Myco. tuberculosis* are of two types, direct and indirect.

1. The Direct Method. In the direct method the decontaminated, concentrated clinical materials are directly seeded onto a medium containing no drugs and onto a medium containing selected concentrations of an antituberculous drug. The disadvantage of this method is that the size of the inoculum is not easily controlled.

However, this disadvantage may be partly overcome by the use of different dilutions of the decontaminated, concentrated material. On the other hand, the great advantage of the direct method is that the time required before a clinical laboratory report can be made is considerably shortened.

2. Indirect Methods. There are two indirect methods:

(a) The first type is that in which primary isolation is made on an artificial medium without drugs and a suspension of the acid-fast bacilli isolated is prepared from this culture. An appropriate dilution of the suspension is then inoculated onto plates or into tubes of medium containing selected concentrations of the drug to be tested.

(b) The second indirect type makes use of primary isolation, as in the first type, and then a subculture is made to a liquid medium containing Tween 80 (brand of polysorbate 80) for dispersed growth. Then with a "controlled" size of inoculum, tubes or plates of a solid medium with and without drugs are inoculated.

The latter indirect method has the advantage that highly precise, quantitative results may be obtained, *provided, of course, that drug-susceptible and drug-resistant strains multiply at the same rate on the primary isolation medium and in the subculture.* Unfortunately, this is seldom the case. Furthermore, the size of the inoculum plays an enormous role in determining the limits of usefulness of all tests of drug-susceptibility. For example, too large an inoculum will mask the presence of large numbers of drug-susceptible organisms. Indeed, after all the drug-susceptibility-resistant tests which have been performed and reported, and in consideration of all the attempts which have been made to correlate the results of in vitro drug-resistance tests with clinical response to chemotherapy, the existence of bacterial population differences very rarely has been kept in mind. In fact, as many as 99.9 per cent of the bacterial cells isolated may be susceptible to the drug in question, whereas a drug-resistant test performed using a large inoculum will give a distorted result indicating that all the bacterial cells in the population are resistant. The masking of culture population differences with respect to drug-resistant versus drug-susceptible organisms has been emphasized in published reports.[14,15] Thus, in the research and development service laboratories of this hospital, a new medium was adopted which would provide the most rapid growth from an inoculum containing small numbers of viable cells.[13] Also, a method was developed for performing direct drug-susceptibility tests, and this method was published as an intraservice report.[16]

SUMMARY

Certain facts have become evident from research conducted both in the research and development service laboratories at this

hospital and in other investigative laboratories. Among these are:

1. When therapy consisting of one drug or a combination of drugs fails, it is necessary to alter the therapy by use of antituberculous drugs that have been found to be effective against the *Myco. tuberculosis* which still can be isolated from that patient.

2. It has become important to determine the serum levels of the specific antituberculous drugs being used in the chemotherapy of tuberculosis, particularly biologically active isoniazid. The standard 300-mg dose of isoniazid per day is probably not adequate therapy for many patients.

3. Each patient who does not respond to the specific antituberculous drug as anticipated must be studied to quantitatively determine the percentage of *Myco. tuberculosis* which are susceptible or resistant to the drugs being used.

REFERENCES

1. Morse, W. C.; Weiser, O. L.; Kuhns, D. M.; Fusillo, M.; Dail, M. C.; and Evans, J. R.: Study of virulence of isoniazid-resistant tubercle bacilli in guinea pigs and mice; preliminary report. *Am. Rev. Tuberc.* 69: 464-468, Mar. 1954.

2. Schmidt, L. H.; Middlebrook, G.; Lincoln, A. F.; Cohn, M. L.; Jolly, P.; and Morse, W. C.: Unpublished data.

3. Middlebrook, G.: Isoniazid-resistance and catalase activity of tubercle bacilli; preliminary report. *Am. Rev. Tuberc.* 69: 471-472, Mar. 1954.

4. Neumayr, R. B.; Morse, P. Z.; and Morse, W. C.: Relationship between isoniazid resistance, endogenous catalase activity and guinea pig pathogenicity of Mycobacterium tuberculosis. *Proc. Soc. Exper. Biol. & Med.* 89: 468-471, July 1955.

5. Kelly, J. M., and Poet, R. B.: Estimation of isonicotinic acid hydrazide (nydrazid) in biologic fluids. *Am. Rev. Tuberc.* 65: 484-485, 1952.

6. Hughes, H. B.: On metabolic fate of isoniazid. *J. Pharmacol. & Exper. Therap.* 109: 444-452, Dec. 1953.

7. Morse, W. C.; Pinney, C. T.; Chambers, J. S.; Morse, P. Z.; and Weiser, O. L.: Chemotherapeutic significance of isoniazid serum and plasma levels determined chemically and biologically. Trans. Rocky Mountain Branch AAAS, Apr. 1955.

8. Biehl, J. P., and Vilter, R. W.: Effect of isoniazid on vitamin B_6 metabolism, and its possible significance in producing isoniazid neuritis. *Proc. Soc. Exper. Biol. & Med.* 85: 389-392, Mar. 1954.

9. Morse, W. C.; Curry, F. J.; Morse, P. Z.; Chambers, J. S.; and Lincoln, A. F.: Effect of oral PAS on biologically active isoniazid serum levels. In *Transactions of the 15th Conference on Chemotherapy of Tuberculosis,* held Feb. 6 to 9, 1956. at the St. Louis Medical Society, St. Louis, Mo., by the Veterans Administration, Army, and Navy, with the cooperation of the National Tuberculosis Association.

10. Tucker, W. B., and Livings, D. G.: Isoniazid, streptomycin, and para-aminosalicylic acid compared as two-drug regimens in treatment of pulmonary tuberculosis among previously untreated patients. *Am. Rev. Tuberc.* 72: 756-782, Dec. 1955.

11. Wilson, G. E.: Hepatic toxicity of pyrazinamide; report on 687 patients. U. S. Public Health Service cooperative clinical investigation. Presented at the meeting of the *National Tuberculosis Association,* Milwaukee, Wis., May 22-27, 1955.

12. Perry, C. R., and Morse, W. C.: Pyrazinamide susceptibility of isoniazid-resistant mutants of tubercle bacilli. (Notes) *Am. Rev. Tuberc.* 72: 840-842, Dec. 1955.

13. Cohn, M. L.; Oda, U.; Kovitz, C.; and Middlebrook, G.: Studies on isoniazid and tubercle bacilli; isolation of isoniazid-resistant mutants in vitro. *Am. Rev. Tuberc.* 70: 465-475, Sept. 1954.

14. Morse, W. C.; Walrath, P. Z.; Weiser, O. L.; and Stratton, G.: Comparative study of methods for determining the resistance of tubercle bacilli to isoniazid; preliminary

report. In *Transactions of the 13th Conference on the Chemotherapy of Tuberculosis*, Feb. 8 to 11, 1954, at the St. Louis Medical Society, St. Louis, Mo., by the Veterans Administration, Army, and Navy, with the cooperation of the National Tuberculosis Association. pp. 227-231.

15. Middlebrook, G.: Techniques of drug-resistance tests. *Am. Rev. Tuberc.* 70: 922-923, Nov. 1954.

16. Morse, W. C.; Weiser, O. L.; Morse, P. Z.; Wertheim, L.; and Lincoln, A. F.: *Quantitative Method for Determining Drug Susceptibility and Resistance of Tubercle Bacilli at Primary Isolation.* Research and Development Service, Fitzsimons Army Hospital, Report No. 1, May 27, 1955.

THE "CHIEF" COMPLEX

"Formerly, what I call 'the chief complex' predominated. Teaching hospitals tended to be divided into separate firms and departments, the headship of which was achieved automatically by the passage of years. (Surely it is a biological absurdity to assume that ability, any more than somatic growth, continues through life?) The system demanded that the chief should receive respect amounting almost to servility from his juniors. His word was law and it was unheard of for a junior to engage him in debate. This order of things harmed all but the best of the senior clinicians. They were deprived of the modulating, stimulating, and corrective influence of keen young minds. They came to rely too much on their own judgment and ability. For many the attainment of senior-staff status, with its attendant retinue of yes-men, initiated premature intellectual senility. At its worst this system sometimes resulted in a nonentity filling senior office for many years. Those of us who wish to preserve our faculties in some sort of useful working order surround ourselves with no-men, to ensure that our standards shall not sag with our waist-line."

—W. MELVILLE ARNOTT, M. D.
in *Lancet*, p. 785, Oct. 15, 1955

FACILITIES FOR MILITARY PATIENTS WITH BURNS OR ACUTE RENAL FAILURE

Air Evacuation and Specialized Treatment

ROBERT D. PILLSBURY, *Lieutenant Colonel, MC, USA*
PAUL E. TESCHAN, *Major, MC, USA*
CURTIS P. ARTZ, *Lieutenant Colonel, MC, USA*

THE SPECIALIZED services available at the Surgical Research Unit of this medical center are called to the attention of all medical officers by Circular Number 16 from the Office of the Surgeon General, U. S. Army, dated 3 March 1955. These services are specifically available to the armed services for the treatment of patients either with *extensive burns* or with *acute renal failure*. Any hospital commander in the zone of the interior may call the Burn Ward at Brooke Army Hospital, for assistance when he has a patient in either of these two categories. Because of the excellent co-operation of the Patient Movement Control Section of Military Air Transport Service, either a burn team or a renal team may be expeditiously transported to the patient's bedside to provide assistance in the treatment of the patient and to supervise his evacuation to this hospital.

PATIENTS WITH EXTENSIVE BURNS

Since January 1952, more than 80 patients with burns have been successfully evacuated from hospitals in the continental United States to the Burn Center of the Surgical Research Unit. Results obtained in these patients illustrates the contribution of the Surgical Research Unit to the management of patients in this category.

In most cases as soon as the burned patient arrives in a hospital ward, the ward officer in charge and/or the hospital commander contacts the Burn Center via telephone for specific advice on all aspects of early management of the severely burned patient until a burn team can arrive at the patient's bedside. Immediately after the initial telephone call, the Military Air Transport Service is contacted, and usually within two hours a burn team can be en route to the Air Force base nearest the

From Brooke Army Medical Center, Fort Sam Houston, Tex.

hospital in which the patient is located. Representatives of the hospital frequently meet the burn team at the airport to provide efficient transportation of the team and its equipment to the patient's bedside. Further help in the management is provided: the burn team aids in calculating the exact volumes of colloid and electrolyte solutions required by the patient, suggests additional immediate local care of the burned surface, and performs a tracheotomy if indicated.

It was found that air evacuation of patients is better tolerated within the first 48 hours following the burn than at any time in the next two weeks. The C-131 (convair) aircraft with pressurized cabin used in these evacuation trips provides excellent room and suitable equipment for care of the burn patients while in flight. Oxygen is available when indicated, as well as suction apparatus for proper cleaning and toilet of the upper tracheobronchial tree.

On arrival at Brooks Air Force Base, San Antonio, Tex., the patient is transferred at once either by ambulance or helicoptor to Brooke Army Hospital.

With standing authorization for telephone communication and for dispatch of a burn team, physicians throughout the entire United States have obtained excellent advice on the management of burns immediately, have begun definitive therapy within a few hours following the injury, and such therapy safely continued without interruption through air evacuation over long distances. Again experience has proved transfer of severely burned patients within the first 48 hours following a burn can be done with a greater degree of safety than if the patient is held for several days prior to transfer.

ACUTE RENAL FAILURE

The same authorization for telephone communication, dispatch of a renal team to the patient's bedside, supervision of the patient during air evacuation, and admission to the Surgical Research Unit Ward, Brooke Army Hospital, was extended in 1954 for patients with acute renal failure (acute uremia, "lower nephron nephrosis"). This authorization was in recognition of the fact that although such acute renal failure is potentially reversible, complications during management result in a high mortality rate.

The facilities available to the Surgical Research Unit in the management of such patients include a trained staff (the renal team), an excellent supporting laboratory, and an artificial kidney.

Contact with the Surgical Research Unit for information is invited, and transfer of patients to this facility is authorized if the following criteria are met:

1. It is reasonably certain that the patient's urinary output has been less than 500 ml per 24 hours for at least three days, with a urinary specific gravity less than 1.030; that is, persistent oliguria in the absence of dehydration is documented. If acute renal failure follows trauma, metabolic abnormalities may progress at such a rate as to endanger the patient if transfer is delayed beyond three days following the onset of oliguria. Transportation of patients with acute renal failure following the third day becomes increasingly hazardous.

2. The patient is not hypotensive, that is, has been fully resuscitated from any previous episode of shock.

3. The continuity of the genito-urinary tract has not been interrupted.

4. Irreversible chronic renal disease as the cause of oliguria has been excluded with reasonable certainty.

In the first six months after the institution of this evacuation service, five such patients were admitted to the Surgical Research Unit Ward following successful air evacuation. Treatment of the patient was carried forward by use of the artificial kidney when potassium intoxication or clinical uremia progressed despite medical management.

SUMMARY

Because of the extensive requirements of both clinical personnel and laboratory support, optimal management of patients with burns or with acute renal failure, particularly of traumatic origin, cannot be provided in all medical installations throughout the armed services.

Announcement is made of the availability of such facilities to all patients of the armed services in the continental United States at the Surgical Research Unit, of this center. A burn team or a renal team may be dispatched to the patient's bedside to assist in management at the point of origin and during evacuation of such patients by way of Military Air Transport Service to Brooke Army Hospital. Communication for such information and arrangements has been authorized.

Wait for the public to make you a specialist—don't anoint yourself.—Martin T. Fischer

USE OF THE SHELDEN TRACHEOTOME IN MILITARY MEDICINE

BENJAMIN L. CRUE, Jr., *Lieutenant Commander, MC, USN*

EMERGENCY tracheotomy can be a lifesaving procedure. Conversely, the lack of an adequate airway can rapidly prove fatal. This is true both in larger medical facilities where available means for tracheotomy are not always utilized in time and also at smaller aid stations where the necessary equipment may not be available. The standard operative method for tracheotomy as an emergency procedure requires considerable time and may add further trauma to a patient already in a critical condition.

To obviate these deficiencies the Shelden tracheotome was developed.[1] This consists of a short-slotted No. 13 needle, a tapered tracheotomy tube, and a cutting trocar (figs. 1 and 2). Briefly, it is used in the following manner: The operator stands at the head of the patient. The neck is extended. The slotted needle is easily inserted through the skin and angled downward into the trachea about one inch below the larynx. The needle can unmistakably be felt entering the lumen, and the breath sounds soon verify its position. The needle is then rotated so that the slot is lateralward. Next, the ball tip on the cutting trocar (already in place inside the tracheotomy tube) is inserted into the slot and the entire instrument is pushed forcibly downward. When the ball has passed beyond the end of the needle, the needle is withdrawn. The tracheotomy tube is then pushed on into place. Removal of the trocar then leaves the tracheotomy tube in its usual position. The entire procedure requires no other instruments and takes from 15 to 30 seconds.

The author has performed this type tracheotomy on 10 patients. The only complication encountered was in one case where, through undue haste, the operator stood beside the patient's bed and attempted to work backwards. The patient had ceased breathing and, in attempting to insert the cutting trocar, the slotted needle slipped out of the trachea. A second uneventful puncture of the trachea was carried out.

While the original purpose of the Shelden tracheotome was its use in emergency situations, the procedure has proved so simple

From U. S. Naval Hospital, Chelsea, Mass.

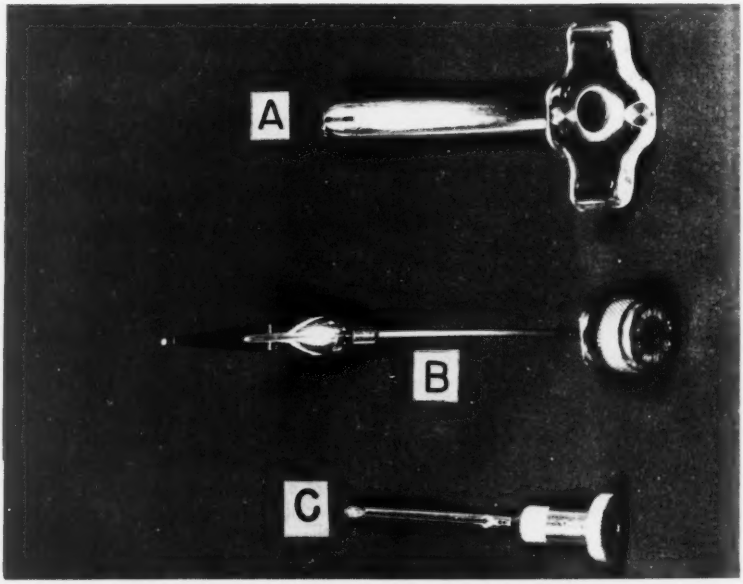


Figure 1. Anterior view of instrument showing (A) *tapered tracheotomy tube,* (B) *cutting trocar, and* (C) *slotted needle.*

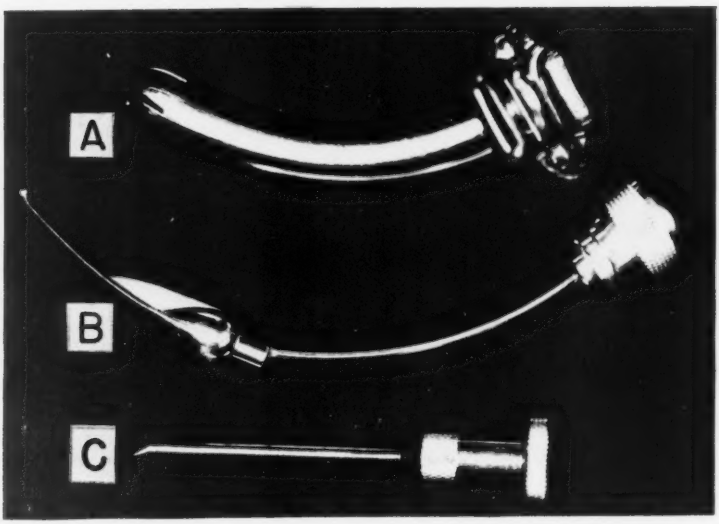


Figure 2. Lateral view.

and safe that the instrument has been used in a variety of conditions. On the neurosurgical service it has been used on unconscious patients with head injuries, as well as on postoperative craniotomy cases. A better airway for oxygen-carbon dioxide exchange is provided, and accumulated secretions can be aspirated more easily.

The first patient on whom the procedure was tried at this hospital, in December 1955, was a fully conscious, 230-lb., thick-necked man who required tracheotomy two days after a thoracotomy had been performed. Using 2 cc of 1 per cent procaine anesthesia, the instrument was inserted without difficulty.

Another case in which the instrument was used occurred after thyroidectomy, where hemorrhage was discovered while the patient was still on the recovery ward. To control the bleeding the wound was reopened. After the hemorrhage had been stopped and even though the trachea was fully exposed, the Shelden tracheotome was used in the belief that the tighter fit obtained by this method might decrease the amount of wound soilage.

That no intensive instruction in the use of this instrument is needed for a physician, was shown in a recent case of encephalitis where the surgical watch medical officer easily performed an emergency tracheotomy as described above without ever having handled the instrument previously. It is believed that corpsmen on independent duty could be instructed in its use. Certainly the risk of complications from its use would in all probability be less than the risk of foregoing a needed tracheotomy. It is anticipated that within a few years this instrument, or an improved variation, will be standard equipment, not only on admission and emergency wards of the large military hospitals, but also at forward and emergency aid stations in all branches of the service.

REFERENCE

1. Shelden, C. H.; Pudenz, R. H.; Freshwater, D. B.; and Crue, B. L.: New method for tracheotomy. *J. Neurosurg.* 12: 428-431, July 1955.

Our profession is the only one which works unceasingly to annihilate itself.—Martin T. Fischer

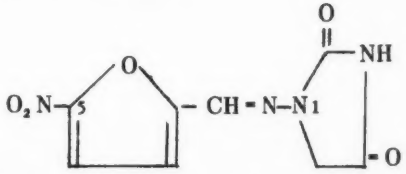
CASE REPORTS

Sensitivity to Furadantin

JOSEPH REBHUN, *Captain, MC, USA*

FURADANTIN (brand of nitrofurantoin) is a relatively new drug that was produced through systematic investigation of compounds containing the furan nucleus. Its predecessor is the familiar Furacin (brand of nitrofurazone), which is one of the products obtained by adding a nitro group at position 5 in the furan nucleus. Furacin was found by Dodd and Stillman[1] to have a considerable antibacterial activity. It is used as a dressing for wounds, in the treatment of patients with ulcers, and as an antiseptic. Some cases of sensitivity to furacin have been noted.

Furadantin [N-(5-nitro-2-furfurylidene)-1-aminohydantoin] has the following structural formula:



It is a wide-spectrum antibiotic, both bacteriostatic and bactericidal, and is effective against gram-positive and gram-negative micro-organisms. Because of its effectiveness in the treatment of bacterial invaders of the urinary tract, it is now being used more extensively for this purpose, and awareness of possible sensitivity reactions is important. It therefore seems appropriate to direct attention to such sensitivity in the following case report.

CASE REPORT

A 50-year-old patient had polyuria for several years. On 16 May 1954, she was injured in a car accident, sustaining fractures of several ribs on the right and left, both pubic rami, and the left tibia. The patient had grossly bloody urine, and a retention catheter was inserted. She developed urinary tract infection, which apparently was controlled by chlortetracycline hydrochloride (aureomycin). After several weeks of

From Letterman Army Hospital, San Francisco, Calif.

hospitalization, her condition improved and she was discharged from the hospital.

On 17 November 1955, the patient complained of pain in the left lower quadrant. On physical examination there seemed to be a mild tenderness to pressure in the bladder area and over the left adnexa. A roentgenogram revealed a calcified body in the lower left pelvic region, suggestive of a ureteral calculus. Her urine showed clumps of white blood cells and bacteria. Culture of the urine revealed *Proteus* and *Aerobacter aerogenes*. The organisms showed a resistance to all tested antibiotics except Furadantin and bacitracin.

The patient was given 100 mg of Furadantin every 6 hours. With the first few doses of Furadantin she was given Benadryl (brand of diphenhydramine hydrochloride) for her incidental rhinitis. After a total dosage of 33 tablets of Furadantin, the patient developed a papulomacular rash that involved her trunk and extremities, being most marked on volar sides of her arms (figs. 1 and 2). The head, face, neck, and mucous

Figure 1. Papulomacular rash on extremities.

membranes were not affected. Her temperature was normal and there were no signs of upper respiratory tract infection. She was put on Benadryl after Furadantin was discontinued. The following night her temperature rose to 104.5°F and the rash became more accentuated, particularly on the lower limbs, but there were no other signs of illness,

and no discomfort. The next day, although her temperature dropped 2.5°F, she was apprehensive and mildly dyspneic, and had a feeling of "squeezing" in her chest. She was hospitalized for 24 hours. No treatment other than Benadryl was given.

Figure 2. Papulomacular rash on trunk and arms.

The laboratory findings were as follows: white blood cell count, 6,050 per μl, with a differential count of 60 per cent neutrophils, 35 per cent lymphocytes, 1 per cent monocytes, 4 per cent eosinophils; hemoglobin, 13.3 g/100 ml; bleeding time, 2¼ min; coagulation time, 5¼ min; platelets normal; sedimentation rate, 37 mm/hr; hematocrit, 42/100 ml; urine, normal, except for 8 to 10 white blood cells. A roentgenogram of the chest was normal.

After discontinuation of the drug all the symptoms ceased, except for the rash, which disappeared two weeks later. Her urine still showed white blood cells, although it was sterile.

COMMENT AND DISCUSSION

The patient's medical history was irrelevant, except for allergy. Her allergic rhinitis was of many years' duration, and she had had a systemic reaction to sulfonamides in 1954. She had never before been exposed to Furadantin or to a related compound, but there was an incubation period of 8 days after the start of Furadantin

medication. This is sufficient time for the production of an anamnestic reaction during the course of treatment.

Other criteria to classify this case as a sensitivity reaction are: The patient was known to have other allergies, in particular another drug allergy. She received a therapeutic dose that does not cause similar symptoms in a majority of patients. There was no cumulative effect, inasmuch as this drug is eliminated very quickly. The allergic symptoms would not seem to be related to the pharmacologic action or usual toxic effects of the drug, or to the tissue which is the therapeutic target. These criteria, which would apply to any drug sensitivity, are stressed to emphasize the necessity of differentiating allergic reactions from toxic ones. The latter are usually a function of the dose; the former may become dramatic if not recognized early.

Classification of the side effects of Furadantin as either toxic or allergic is useful, although a sharp distinction cannot always be drawn between the two groups of symptoms. Some cutaneous skin reactions due to drugs might not be allergic.[2] Thus, to list certain of the manifestations in the group "allergic reactions" would merely indicate that they usually appear in drug allergies, but may be of a nature other than allergic.

The *toxicity* of Furadantin as reported by numerous authors[2-6] affects mainly the gastro-intestinal tract, causing gastric irritation, nausea, vomiting, and diarrhea, with nausea the most prominent symptom, by far. Hasen and Moore[6] also reported a few instances of dizziness, headache, and numbness of the extremities, plus a single case of blood dyscrasia out of a total of 100 patients. Richards and his associates[5] mention one case of vertigo and nystagmus.

Relatively few *allergic reactions* have been reported, although out of 42 patients, Draper and his associates[4] stated that they found 17 cases of eosinophilia and 3 of mild generalized erythematous and exfoliative skin rash. Other investigators,[2,3,6,7,9] out of a total of 346 patients studied, found 3 cases of urticaria, 2 of diffuse maculopapular eruption, 2 of angioneurotic edema, and 1 of general pruritus. Finally, 2 cases of pulmonary infiltration have been observed radiographically.[10]

These untoward reactions seem to appear in a range close to the one seen in treatment with tetracyclines. They can be alleviated by decreasing the dose, giving the drug with food and alkalies, and coating the tablets. Preliminary investigations of possible renal or hepatic toxicity and testicular suppression suggest that the drug does not affect the kidneys, liver, or testes. No definite neurotoxicity has been described, nor have superimposed infections, in particular with bacterial strains resistant to usual anti-

biotics, been stressed. No anaphylactic reaction has yet been reported.

The case described in this report is the first clear-cut sensitivity reaction noted in this hospital since Furadantin was introduced here three years ago. Data furnished by the chief of the genito-urinary service indicates that of about 750 inpatients per annum, 100 receive Furadantin; of 2,500 outpatients, 300 are so treated. The usual course of treatment is 5 or 6 days, but there are cases where the drug has been continued as long as 90 days. Side effects, related primarily to the gastro-intestinal tract, necessitate discontinuance of Furadantin in about 2 or 3 patients per month.

REFERENCES

1. Dodd, M. C., and Stillman, W. B.: In vitro bacteriostatic action of some simple furan derivatives. *J. Pharmacol. & Exper. Therap.* 82: 11-18, Sept. 1944.

2. Trafton, H. M.; Beutner, E. H.; Petronio, J. J.; Lind, H. E.; and Correia-Branco, M.: Furadantin in urinary-tract infections; clinical and laboratory studies. *New England J. Med.* 252: 383-387, Mar. 10, 1955.

3. Carroll, G., and Brennan, R. V.: Furadantin. *J. Urol.* 71: 650-654, May 1954.

4. Draper, J. W.; Zufall, R.; Rosenberg, L. T.; and Knight, V.: Effect of nitrofurantoin on Bacteruria of infection following prostate operation. *J. Urol.* 72: 1211-1217, Dec. 1954.

5. Finn, J. J., Jr.: Treatment of urinary tract infections with furadantin. *Bull. Tufts-New England Medical Center* 1: 180, July-Sept. 1955.

6. Hasen, H. B., and Moore, T. D.: Nitrofurantoin; study in vitro and in vivo in 100 cases of urinary infection. *J. A. M. A.* 155: 1470-1473, Aug. 21, 1954.

7. Johnson, S. H., III, and Marshall, M., Jr.: Nitrofurantoin therapy of urinary tract infections in children. *A. M. A. Am. J. Dis. Child.* 89: 199-201, Feb. 1955.

8. Richards, W. A.; Riss, E.; Kass, E. H.; and Finland, M.: Nitrofurantoin; clinical and laboratory studies in urinary tract infections. *A. M. A. Arch. Int. Med.* 96: 437-450, Oct. 1955.

9. Jensen, H. B.; Lund, J.; Poulsen, P. E.: Furadantin et nyt kemoterapeutikum mod urinvejsinfektioner. *Ugesk. laeger* 116: 53-56, Jan. 14, 1954.

10. Eaton Laboratories: Personal communication.

THE GOOD SPEAKER

"Medical educators state that one of the greatest needs in medicine today is for qualified and inspiring teachers. Good pedagogy is closely bound to good and effective methods of presentation of material which is another way of saying that a good teacher is a good public speaker. A little thought on the subject will show that in the Army many choice assignments, professional and staff, depend upon teaching and speaking ability. For this reason, it is desirable to improve our technic of presentation of ideas."

—WARNER F. BOWERS, Col., MC, USA
in *Military Medicine*
p. 455, Nov. 1955

The Use of Epiphyseal Stapling in Unusual Situations

AUGUST W. SPITTLER, *Colonel, MC, USA*
ROBERT J. BARNETT, *Lieutenant Colonel, MC, USA*

EPIPHYSEAL plate stapling as a method of retarding unequal bone growth in the lower extremities and for straightening deformed extremities has become commonplace. Two unusual cases in our series of patients at this hospital are presented to illustrate further use of this method. One patient was an achondroplastic dwarf with severe angulatory deformity of both knees, and the other patient had genu valgum following a closed fracture.

The role of the epiphyseal plate in longitudinal growth was studied as far back as 1794 when John Hunter bored two holes in the diaphysis of the tibia of a young pig and filled them with lead. After the growth of the pig, the space between the lead markers measured exactly the same as when bored. Macewen,[1] in the early 1900's removed a large segment from the shaft of the radius of a dog, placed metal caps as markers over the sectional ends of the bone, and showed thereby that growth was entirely in the epiphysis as the metal caps approached each other. Ollier,[2] in 1888, was probably the first to deliberately arrest growth to correct deformity by resecting both epiphyseal cartilages of the fibula in correction of a varus deformity of the ankle.

The modern method of temporary epiphyseal arrest was instituted by Haas[3-5] when he discovered that the epiphyseal plate could be arrested with a wire loop and that growth was resumed when the wire broke or was removed.

In 1949 and 1952 Blount and Clark[6] and Blount and Zeier[7] reported on the use of stainless steel staples to produce temporary epiphyseal arrest. Spittler and Brannon[8] in an attempt to shorten the operating time and avoid possible damage to the epiphyseal plates by a misplaced staple, advocated the use of a thin Kirschner wire as a guide. In the cases reported herein, the staples were inserted with the Kirschner wire as a guide.

From Walter Reed Army Hospital, Washington, D. C. Col. Spittler is now assigned to Tokyo Army Hospital, APO 500, San Francisco, Calif.

392347 O - 56 - 8

CASE REPORTS

Case 1. A six and one-half-year-old girl with achondroplasia and severe angulatory deformities of the knees had been treated with braces in the orthopedic clinic for some time with little improvement. On admission to this hospital, examination of her lower extremities revealed a 35-degree genu valgum of the left knee and a 17-degree genu varum of the right knee (figs. 1 and 2). On 15 March 1951 the medial femoral

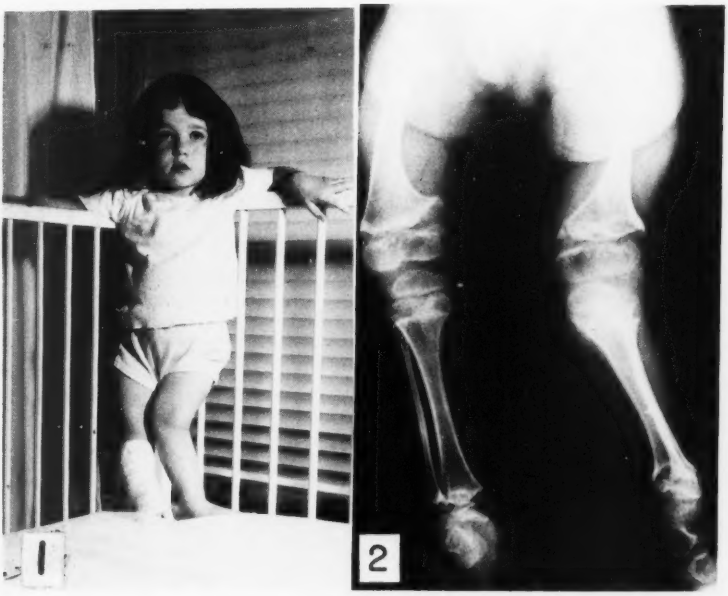


Figure 1 (case 1). Severe angulation deformity of both knees. Figure 2 (case 1). Roentgenogram showing knee deformities before corrective operation.

and medial tibial epiphyses at the left knee and the lateral femoral epiphysis at the right knee were stapled. Because there were no staples with wide enough spread or deep enough prongs available, handmade ones were fashioned in the operating room from stainless steel Kirschner wires. By 24 March 1953 the right knee had slightly overcorrected and the left knee was straight (figs. 3 and 4). The staples were removed from the right knee in April, but were allowed to remain in the left knee until September 1953. Two years were required for the correction, but this was not an unusual length of time because of the nature of the condition. It is now believed that the overcorrection in the right knee was unnecessary as it has been slow in returning to normal and is still slightly valgus in alignment. When the patient was observed almost a year after the removal of the staples, the left knee had continued to remain straight.

Case 2. This six-year-old boy had moderately severe genu valgum of the right knee, the result of a fracture in the proximal third of the tibia in the previous year (figs. 5 and 6). Because of the pronating effect this was having on his foot, stapling was advised to correct the deformity. On 17 May 1950 the medial tibial epiphysis at the knee was

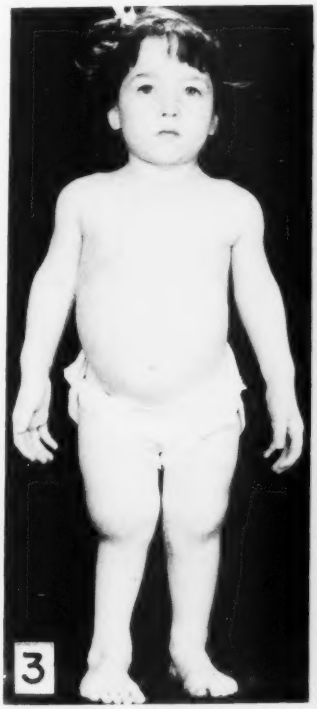


Figure 3 (case 1). Postoperative correction of left knee with slight overcorrection of right knee. Figure 4 (case 1). Roentgenogram showing position of staples and correction of deformity.

stapled (fig. 7) and by December 1951 a slight overcorrection had been accomplished and the staples were removed (fig. 8). It is interesting to note that with the correction of the valgus deformity of the right knee, the right foot pronation eventually became less than that of the opposite foot.

SUMMARY

Epiphyseal stapling was used in the correction of deformities of the knees in two unusual cases. One patient was an achondro-

Figure 5 (case 2). Moderate genu valgum, right knee, secondary to fracture with pronation of foot. Figure 6 (case 2). Roentgenogram showing genu valgum secondary to fracture of tibia.

Figure 7 (case 2). Roentgenogram showing position of staples. Figure 8 (case 2). Deformity of right knee and foot corrected.

plastic dwarf with severe angulation deformities of both knees. The other patient, a six-year-old child, had genu valgum as the result of a fracture. Excellent clinical results were obtained.

REFERENCES

1. Macewen, W.: *The Growth of the Bone.* James Maclehouse and Sons, Glasgow, 1912.

2. Ollier, L.: *Traité des Resections et des Opérations Conservatrices Qu'on Peut Pratiquer sur le Système Osseux.* G. Masson, Éditeur, Paris, 1888. Vol. 2, Résection en particulier.—Membre Supérieur. p. 473.

3. Haas, S. L.: Retardation of bone growth by a wire loop. *J. Bone & Joint Surg.* 27: 25-36, Jan. 1945.

4. Haas, S. L.: Restriction of bone growth by pins through epiphyseal cartilaginous plate. *J. Bone & Joint Surg.* 32-A: 338-343, Apr. 1950.

5. Haas, S. L.: Mechanical retardation of bone growth. *J. Bone & Joint Surg.* 30-A: 506-512, Apr. 1948.

6. Blount, W. P., and Clark, G. R.: Control of bone growth by epiphyseal stapling; preliminary report. *J. Bone & Joint Surg.* 31-A: 464-478, July 1949.

7. Blount, W. P., and Zeier, F.: Control of bone length. *J. A. M. A.* 148: 451-457, Feb. 9, 1952.

8. Spittler, A. W., and Brannon, E. W.: Technic for insertion of metal staples in cases of epiphyseal growth arrest. *Am. J. Surg.* 79: 834-836, June 1950.

THE GROWTH OF THE DOCTOR

"The good physician must be educated to grow in step with the growth of medicine. It is important to distinguish what is implied by that much-abused word "training" from "education." Training implies drill. The aim is to achieve the skill and precision of the drill-master. Education, on the contrary, implies growth, growth unlimited, autonomous, and in perpetuity, but by no means undisciplined.

"A medical education must furnish not only the basic core of knowledge without which the title "doctor" cannot be honourably borne, but an abundant, vivid, and practical experience in the use of scientific method. Of the two, the latter has the greater value, since it is the enduring instrument whereby new knowledge can be won and all knowledge can be tested. It is the means of continued healthy growth that assures that the ageing physician's practice will not remain for ever that of his first indoctrination."

—AVERILL A. LIEBOW, M. D.
in *British Medical Journal*
p. 306, Feb. 11, 1956

The Bender-Gestalt Test

In a Patient Passing Through a Brief Manic-Depressive Cycle

EDWARD J. MURRAY, *First Lieutenant, MSC, USAR*
FRANCIS J. ROBERTS, *PFC, Clinical Psychology Technician, USA*

THE PURPOSE of this report is to present the results of the Bender-Gestalt test[1] administered to a patient who was initially depressed, then became manic, and finally reached an equilibrium.

CASE REPORT

The patient, a 26-year-old Negro, came to the clinic because of nightmares, restless sleep, and fleeting thoughts of killing. During the social worker's interview, he appeared constricted and depressed. The Minnesota Multiphasic Personality Inventory showed an elevation of the depression and obsessive worrying scales. At this point the Bender-Gestalt test, using the copy technic alone, was given to the patient with the result shown in figure 1. The figures were drawn in an extremely constricted area.

The patient was treated as an outpatient and was seen 12 days later by a psychiatrist. At this time the patient appeared to be manic with excessive motor activity, rapid and circumstantial speech, and more impulsive thoughts of killing. The Bender-Gestalt test was administered again with the result shown in figure 2. The figures were drawn more expansively and several figures were rotated, distorted, and poorly placed. This pattern is usually viewed as indicating a psychotic involvement.

The patient was hospitalized for 11 days and showed a good superficial improvement as a result of reassurance and milieu therapy. On the day of discharge from the hospital the Bender-Gestalt test was administered again. The result, shown in figure 3, is normal. The figures are relatively free of distortion and show neither constriction nor expansiveness.

As a follow-up the Bender-Gestalt test was administered twice after discharge: 23 days after discharge and again 13 days later. The results were comparable with those in figure 3. Naturally, by this time one would expect some learning effect, but the patient did appear to maintain his improved adjustment, as determined by interview.

From U. S. Army Hospital, Fort Belvoir, Va.

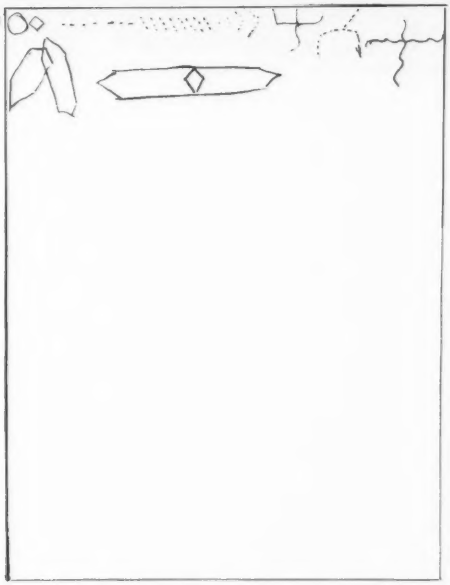


Figure 1. Results of the Bender-Gestalt test while the patient was depressed.

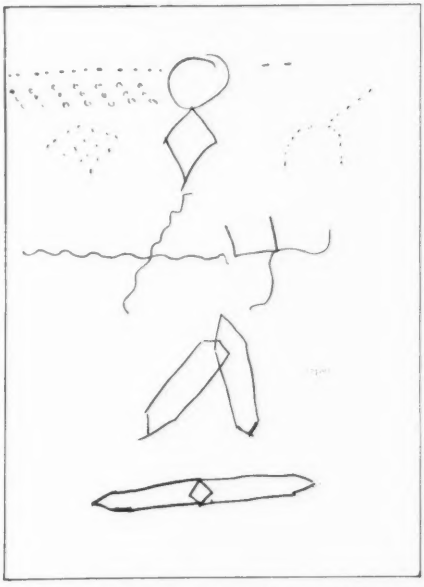


Figure 2. Results of the Bender-Gestalt test when the patient became manic.

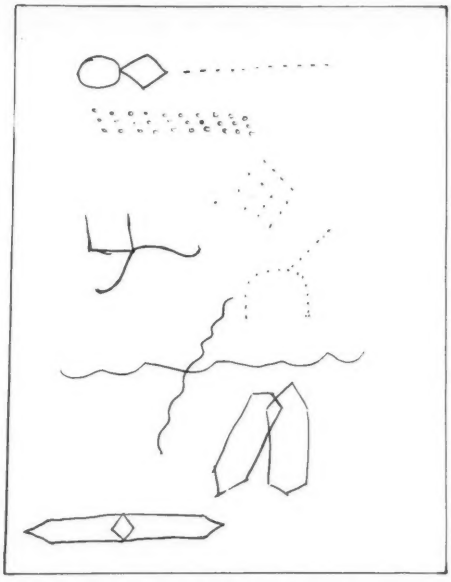


Figure 3. Results of the Bender-Gestalt test after patient's hospitalization during which time he showed some improvement.

The results obtained from this study lend some support to the validity of the Bender-Gestalt test as a measure of personality constriction and expansiveness. More cases are needed before any conclusions are drawn, but it should be noted that these phenomena are difficult to study experimentally and must be caught on the wing in the clinic setting. It is hoped that this result will stimulate further research.

REFERENCE

1. Bender, L.: *A Visual Motor Gestalt Test and Its Clinical Use.* Research Monographs No. 3, American Orthopsychiatric Association. L. G. Lowrey, editor. American Orthopsychiatric Association, New York, N. Y., 1938.

Of course, I teach you only the truth—but that shouldn't make you believe it.—Martin T. Fischer

Scleroderma
Affecting the Masticatory Apparatus

JAMES E. CHIPPS, *Lieutenant Colonel, DC, USA*
VICTOR R. HIRSCHMANN, *Colonel, MC, USA*

SCLERODERMA may involve muscle tissue, limiting the functional development of the part which, not uncommonly, may be the face and neck. The disease is of interest to dentists because of occasional reports of probable gingival and periodontal involvement. However, the disease usually begins in adult life after development of the masticatory apparatus. Therefore, the following instance of the disease beginning in childhood and markedly affecting the development of the oral structures is of interest.

CASE REPORT

A seven-year-old girl came to the dermatology clinic because of a chronic atrophic disease of the lower right face.

Past History. No abnormality had been noted prior to the age of 15 months. At that time, the patient fell from a chair, striking the right side of the face. Two weeks later, a bluish discoloration appeared over the right ramus of the mandible and the submandibular region. In the next three years, the area of disease slowly extended to involve most of the lower right face. A brownish pigmentation appeared which slowly worsened until age four and one half, then slowly improved. Early in the disease, a specialist made a diagnosis of scleroderma and attempted various treatments for about a year without noticeable effect. Since the age of four and one half, the area of involvement had not noticeably increased, but submental and submaxillary node enlargement was noted at age six and one half and a specialist was again consulted. He found brownish pigmentation of the skin of the right preauricular, parotid, mandibular, and cervical regions. The skin appeared translucent and atrophic. Skin veins were prominent. Induration of the right floor of the mouth was noted and missing teeth were reported but no comment was made at that time as to tongue involvement. A roentgenographic survey reported retarded development of the right ramus of the mandible. A skin biopsy was reported as histologically compatible with a diagnosis of scleroderma.

From Madigan Army Hospital, Tacoma, Wash.

Throughout the period rampant caries was noted and several deciduous teeth had been extracted.

No recent changes had been observed and the parent had brought the girl to the clinic on advice of the family physician. The dermatologist referred the patient for dental consultation and the girl was observed in the two clinics for a year.

Physical Examination. Examination of the patient on admission to the dermatology clinic of this hospital revealed atrophy and gray-brown pigmentation of the skin extending from behind her right ear over the right cheek to the midline of the lips and downward over the mandible to include the upper right neck. The involved skin was translucent, veins were prominent, and subcutaneous fat was deficient, but the skin was generally pliable. The entire lower half of the right side of her face was less developed than the left. Her right ear was approximately one third smaller than the left and turned slightly outward. Both lips were thin and compressed against the dental arches on the right. The right half of the mandible was palpably smaller than the left. This general appearance had not altered when the patient was photographed a year later (figs. 1 and 2), although skin pigmentation had improved.

Figure 1. Profile view of patient showing atrophy of the lower right part of the face.

Figure 2. Full-face view of patient shown in figure 1.

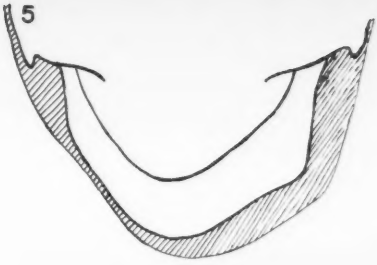
Figure 3. Atrophy of the right half of the tongue.

Figure 4. Posteroanterior roentgenogram showing asymmetry of mandible.

Figure 5. Overlay tracing of posteroanterior roentgenogram accenting mandibular and soft tissue asymmetry.

3

4


5

Intra-orally, the floor of the right side of the patient's mouth was thin and indurated. The right submaxillary duct was atrophied and there was no evidence of sublingual or submaxillary gland function. However, the right parotid duct was patent and discharging saliva. The right half of the tongue was atrophied (fig. 3) and the tongue deviated to the right on extrusion. The mucosa throughout the right side was thickened. Six deciduous molars had been previously extracted. There was a marked distoclusion as well as individual malposition of teeth. Caries was marked. The eruption of teeth appeared chronologically normal.

Figure 6. Lateral roentgenogram of unaffected left body of mandible.

The posteroanterior roentgenogram showed a marked mandibular asymmetry (fig. 4). An overlay tracing of this x-ray (fig. 5) accents the even more marked asymmetry of the soft tissue overlying the mandible. The lateral roentgenograms (figs. 6 and 7) showed that the dental follicles in the affected right side occupied essentially the entire vertical dimensions of the medullary bone. However, the stage of follicular development appeared symmetrical in both right and left sides. In the films, the measurements of the posterior border of the mandible from crest of condyle to angle were 3.9 cm on the right and 5.5 cm on the left. The vertical mandibular thickness in the bicuspid areas was 1.5 cm on the right and 2.3 cm on the left. Horizontal asymmetry was less marked, the inferior border of the mandibular body from angle to canine area measuring 4.7 cm on the right and 5.3 cm on the left.

Course. In the year that the patient was followed, the disease appeared inactive. Growth of the mandible was noted on both sides. Pigmentation of the skin appeared to clear considerably. The indurated mucosa remained unchanged, as did the tongue. No submaxillary or sublingual salivary gland activity was noted.

The patient received dental restorations for caries. Appliances to maintain the spaces created by the loss of deciduous teeth were constructed. During the year, eruption of the permanent bicuspids began bilaterally.

Figure 7. Lateral roentgenogram of right body of mandible showing marked atrophy of bone but similar chronologic development of teeth as on the left.

Contact with the patient was then lost because of a military transfer of the parent.

COMMENT

The most interesting finding in this case is that follicular development and eruption of teeth appeared to be bilaterally symmetrical in spite of the marked unilateral atrophy. The malocclusion and, possibly, the rampant caries were but secondary results of the anatomic asymmetry and malfunction.

The parent definitely related the onset of the disease to the date of trauma. However, the etiology of scleroderma remains unknown.

Repair of Meningomyelocele by Plastic Surgery

BERNARD N. SODERBERG, *Colonel, MC, USA*
JOHN B. SUTTON, *Captain, MC, USA*

AN UNUSUAL procedure of plastic surgery was employed for the repair of a large meningomyelocele in a two and one-half-year-old boy.

CASE REPORT

The patient presented a congenital meningomyelocele of the lumbar region, measuring 8 by 8 cm. The covering layer, composed of epithelium and dura, was so thin and unstable that the life of the child was in constant jeopardy, because rupture followed by meningitis is not an uncommon occurrence under such circumstances. To eliminate this hazard, better defect coverage was imperative. The associated congenital defects were bilateral dislocations of the hips, partial paraplegia, bilateral talipes equinovarus, and apparently arrested hydrocephalus. All mental reactions seemed normal for a child of this age, and laboratory studies were within normal limits.

A combined tube and open flap was constructed to supply skin and subcutaneous soft tissue coverage for the meningomyelocele. Since insufficient lateral tissue was present, the soft tissue transfer was accomplished by transporting an abdominal flap to the recipient site. The posterior thoracic tube was constructed utilizing a partial thickness free skin graft to cover the denuded donor site (fig. 1A). Three weeks after this was healed, the operative procedure for the connecting open flap was begun. This attachment was located on the lateral abdomen (fig. 1B). The operation was performed in three stages, each two weeks apart.

At the fifth operation, the entire structure was transported to the recipient site (fig. 1C). The constructed tube acted as the swing mechanism, allowing the transfer of the abdominal tissue and providing the mother blood supply to the transplant until a new supply developed. The abdominal donor site was closed by dermatome skin graft taken from the thigh. The meningomyelocele was prepared to receive the transplant by de-epithelization. The last operation consisted of removal of the connecting tube. This was performed three weeks after flap attachment to the recipient site.

From Brooke Army Hospital, Fort Sam Houston, Tex. Col. Soderberg is now assigned to U. S. Army Hospital, APO 180, New York, N. Y.

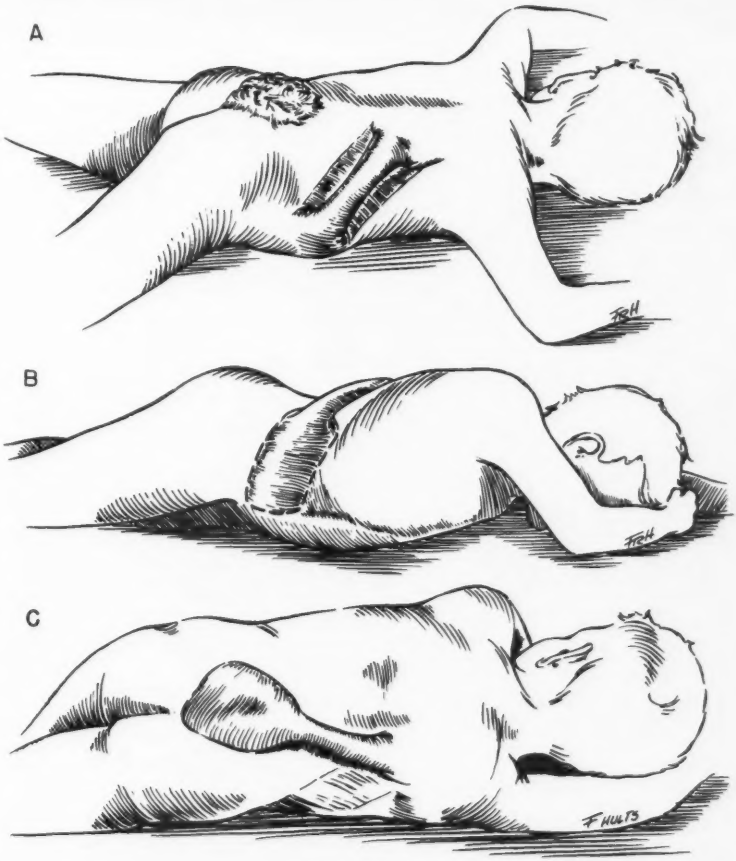


Figure 1 (A) The first-stage construction of the combined tube and open flap. (B) Position of the attached flap. The dotted lines represent summation of delay incisions. (C) Open flap rotated to recipient site.

DISCUSSION

The combined tube and open flap as a unit transplant was shown by one of us[1] to be a satisfactory procedure in large shoulder defects of World War II casualties not remedial by other methods of coverage. Prior to this, the principle was used by others.

The technic of plastic surgery described here is a rather large undertaking for employment in a young child. In the past, the methods of repair have consisted of fascial alterations or local revisions of soft tissues to obtain skin and subcutaneous tissues as a flap.

Adequate coverage eliminates the hazard of rupture, eliminates hypersensitive areas, and in this case offered a resilient covering permitting a modified valvelike action (fig. 2).

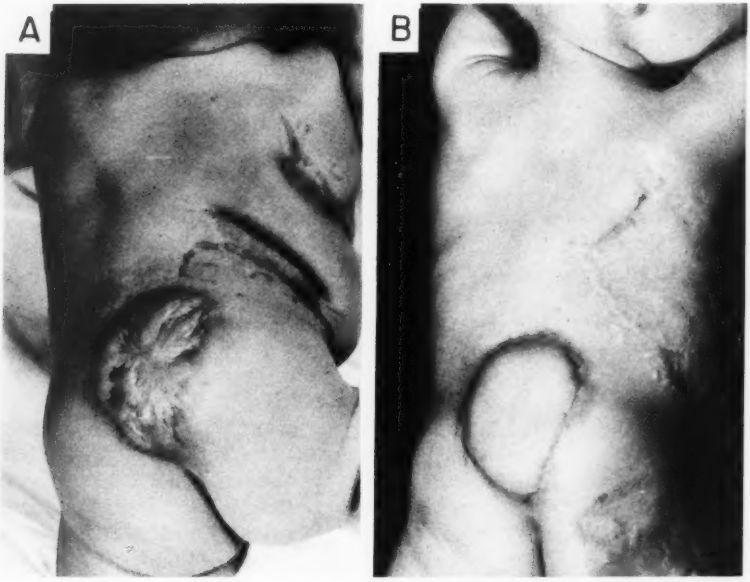


Figure 2. Appearance (A) before and (B) after flap transfer.

REFERENCE

1. Soderberg, B. N.: Massive combined tube and open flap used as unity rotation pedicle transplant for repairs of certain deep surface defects. *Plast. & Reconstruct. Surg.* 3: 407-416, July 1948.

THE OLDER PHYSICIAN

"Statistics show that 13,000 physicians in general practice are over sixty-five, which is the conventional age for retirement. Eight of every 10 physicians over sixty-five are still in active practice. One of every 2 in the group sees more than 40 patients in an average week. One of every 4 treats patients of all ages. One of every 4 will handle all types of cases."

—NICHOLAS S. SCARCELLO, M. D.
in *New England Journal of Medicine*
p. 744, Oct. 27, 1955

A MESSAGE FROM THE A. M. A.

This month our report concerns the Council on Mental Health of the American Medical Association.

In 1930 a temporary Committee on Mental Health was appointed by the American Medical Association Board of Trustees. This Committee submitted a report that was published in the Proceedings of the 84th Annual Session of the House of Delegates. The report dealt with many aspects of the problems relating to mental illness and health, including the scope of prevention and treatment of mental illness, the relationship between physicians and citizens' groups interested in mental health, the legal aspects of mental health, et cetera. A recommendation was made "that a standing Committee be appointed to take such steps as will enable the profession as a whole to assume leadership in mental health, which is its proper responsibility."

The Board of Trustees appointed a standing Committee in December 1951 and the first official Committee meeting was held in March 1952. Among areas selected for consideration by the Committee are: medical education in psychiatry; psychiatric units in general hospitals; stimulation of medical students and other medical personnel to train in the field of psychiatry; improvement of state mental hospitals and private psychiatric hospitals; laws relating to commitment to hospitals for the mentally ill; development of outpatient clinics (mental health clinics); and research in mental illness.

Serving under the Committee on Mental Health are two Subcommittees, a Subcommittee on Alcoholism and a Subcommittee on Narcotic Addiction. The primary purpose of the Subcommittee on Alcoholism is to stimulate the organization of medical programs on alcoholism through the appropriate committees of state and county medical associations. The Subcommittee on Narcotic Addiction's specific purpose is to make a detailed examination of the present status of narcotics and narcotic addiction as it relates to medical practice in the United States and to formulate for presentation to the Board of Trustees an official association point of view on the whole problem of narcotic addiction.

In addition to the two subcommittees, the Committee on Mental Health worked with the Bureau of Exhibits of the American Medi-

---

From the Council on National Defense of the American Medical Association. The views and opinions expressed are not necessarily those of the Department of Defense. —*Editor.*

392347 O - 56 - 9

cal Association to set up an exhibit on alcoholism that presents the current point of view concerning the treatment of alcoholic patients. The exhibit was first presented in the scientific exhibit at the June 1955 meeting of the Committee at Atlantic City. The exhibit is now available for presentation at state medical association meetings, and there have been calls for its use by outside groups.

In 1955, by action of the A. M. A. Board of Trustees, the Committee on Mental Health was given Council status. Since that time the work of the Council office has been steadily increasing. A conference of mental health representatives of the state medical associations, sponsored by the Council, was held on 18 and 19 September 1954 at Association headquarters. Representatives of 36 state medical associations were in attendance at the conference, which considered common problems now affecting the committees on mental health of the state medical associations and published conference proceedings. So successful was this first attempt that the representatives present unanimously agreed that the conference should be held annually. A second conference was held in November 1955, and a third is planned for November 1956.

During the past two years, the Council on Mental Health has been working closely with the American Psychiatric Association, and with representatives from a number of other organizations of national import, toward the creation of a Joint Commission on Mental Illness and Health. The results of this effort came to fruition late in 1955, with the formation of the Joint Commission on Mental Illness and Health, Inc. The purposes of the Joint Commission are: (1) to study mental illness and mental health and the medical, psychological, social, economic, cultural, and other factors that relate to the etiology and course of development of mental illness and to the advancement of mental health; (2) to study ways and means of furthering the discovery, development, and application of all effective methods, practices, and therapies for the diagnosis, treatment, care, and rehabilitation of the mentally ill and retarded and for the promotion of mental health.

Promotions of Officers

The following officers of the military medical services on active duty in the Army, Navy, and Air Force have recently received temporary promotions to the rank indicated.

MEDICAL CORPS

ABBOTT, Joseph L., Capt., USAF
ABRAMS, Fredrick R., Capt., USA
ADAMS, Jerome M., Capt., USA
ALDERSON, Donald M., Col., USAF
ALEXANDER, John G., Capt., USAF
ALKIRE, Leonard E., Capt., USA
ANDREWS, Alan V., Capt., USAF
ANTONELLI, John H., Capt., USAF
ARWOOD, William C., Jr., Capt., USA
BAKER, Floyd W., Capt., USA
BALDWIN, Davis W., Capt., USAF
BARILA, Timothy G., Maj., USA
BARQUIST, Richard F., Maj., USA
BARRETT, O'Neill, Jr., Capt., USA
BEAUCHAMP, Charles J., Capt., USAF
BECKJORD, Philip R., Col., USA
BELLNOSKI, William O., Jr., Lt. Col., USAF
BERGER, Sheldon, Capt., USAF
BERGIN, James J., Capt., USA
BERMAN, Stanley, Capt., USA
BERREY, Bedford H., Maj., USA
BISHOP, Harry A., Capt., USAF
BLAKE, David F., Capt., USAF
BLAKELY, Gene T., Capt., USA
BOEHNING, Harold C., Capt., USA
BOEHRER, Philip M., Capt., USA
BOGER, John N., Capt., USAF
BONNET, John D., Capt., USAF
BORNSTEIN, Joseph H., Col., USA
BOSMAN, Robert I., Maj., USA
BOUZARD, Walter C., Capt., USA
BRESLIN, Harvey J., Capt., USAF
BROWN, Clement R., Jr., Capt., USAF
BROWN, Paul W., Maj., USA
BUESS, John E., Maj., USA
BURROSS, Don C., Capt., USA
BURT, Howard, Capt., USA
BYNUM, Grover L., Jr., Capt., USAF
CAMPBELL, Ira L., Jr., Capt., USAF
CAMPBELL, Robert I., Col., USA
CANBY, John P., Capt., USA
CAREY, Philip O., Capt., USA
CARTER, Chapel E., Lt. Col., USAF
CASTELLOT, John J., Capt., USA
CECCARELLI, Frank E., Capt., USA
CHAMBLIN, Stuart A., Jr., Capt., USA
CHEITLIN, Melvin D., Capt., USA
CHOGICH, John C., Capt., USA
CLEMENT, James E., Capt., USAF
COHEN, Donald B., Capt., USAF
CONRAD, Marcel E., Jr., Capt., USA
COOK, Hugh H., Jr., Capt., USA
COURY, Oswald H., Capt., USA
COX, William A., Capt., USA
DACQUISTO, Michael P., Maj., USA
DAITCH, Martin H., Capt., USAF
DALSIMER, W. D., II, Capt., USA
DAVANAGH, John J., Lt. Col., USAF
DAVIES, James S., Capt., USAF
DAVIS, Edward H., Lt., USN
DAVIS, John M., Capt., USAF
DEAN, Gordon E., Capt., USAF
DEAN, Guy W., Jr., Lt. Col., USAF
DEAN, Harold N., Lt., USN
DEAN, Robert D., Capt., USAF
DEATON, Pleasant P., Capt., USA
DEES, Doyce B., Jr., Capt., USAF
DeHAAS, David R., Capt., USAF
DELIA, Claude W., Maj., USA
DEUBLER, Keith F., Capt., USA
DeVITA, Michael R., Capt., USAF
DEW, Ronald, Capt., USA
DiLORENZO, Anthony, Maj., USA
DIMON, Joseph H., III, Capt., USA
DOBBEN, Glen D., Capt., USAF
DOCTOR, Leroy, Capt., USAF
DORMAN, Thomas W., Capt., USAF
DOSSETT, B. E., Jr., Capt., USA
DOUGLAS, William W., Capt., USAF
DOWNEY, Vincent M., Col., USAF
DUBUY, Carl T., Col., USA
DUFFIELD, John R., Capt., USA
DUNBAR, William F., Capt., USAF
DUNCAN, Julius S., Capt., USAF
DUNN, Peter R., Lt., USN
DURNELL, Monaford D., Lt., USN
EDELSTIEN, Maurice G., Capt., USAF
EDGER, Herbert D., Col., USA
EINARSON, John, Capt., USA
EISNER, David G., Col., USA
ELLINGSON, Harold V., Col., USAF
ERB, Blair D., Capt., USAF
EWART, James A., Maj., USA
FEINGOLD, Albert H., Capt., USAF
FINCH, Charlie B., Capt., USAF
FINLEY, Robert H., Lt. Col., USAF
FITCH, Frank W., Capt., USAF
FITZGERALD, Joseph A., Capt., USAF
FOGLEMAN, James D., Capt., USAF
FRANKLIN, Burton M., Capt., USAF
FRASER, Richard S., Col., USA
GARBER, George L., Capt., USAF
GARVIN, Donald B., Capt., USAF
GERHARDT, William J., Capt., USAF
GIBBS, Winfield S., Capt., USAF
GIBLIN, Thomas J., Jr., Capt., USAF
GINSBERG, David K., Capt., USA
GORMAN, John R., Capt., USAF
GOOTNICK, Eugene Y., Capt., USAF
GORSUCH, George E., Lt., USN
GRANT, Willis J., III, Lt., USN
GRASMICK, Albert L., Capt., USAF
GREEN, Henry D., Capt., USA
GREENDYKE, William H., Capt., USAF
GREENSPAN, Gilbert, Lt., USN
GRIFFIN, Carl R., Jr., Capt., USA
GRIGGS, Oscar B., Col., USA
GUENTER, Kenneth E., Capt., USA
HAGGARD, David B., Capt., USAF
HAMATY, Daniel, Capt., USA
HAMBRICK, Claude S., Capt., USAF
HAMBRIGHT, Rufus R., Maj., USA
HARDIN, John B., Capt., USAF
HAYES, James C., Maj., USA
HENDERSON, Henry G., Capt., USAF
HENDERSON, John A., Lt. Col., USAF
HENRY, Joseph R., Col., USAF
HERMAN, Robert H., Capt., USA
HILL, Frank D., III., Capt., USAF
HILLEY, Robert B., Capt., USAF
HOLDEN, Alfred M., Capt., USAF
HOLDEN, William B., Capt., USAF

HOLLAND, John B., Capt., USAF
HOLT, Alfred T., Lt., USN
HOLTZMAN, Charles M., Lt., USN
HOOVER, Sherman H., Lt., USN
HOPEMAN, Alan R., Maj., USA
HOROWITZ, Herbert I., Lt., USN
HUGHES, Francis H., Jr., Maj., USA
HUKILL, Peter B., Capt., USAF
HULL, Frank J., Lt., USN
HUNSICKER, Philip M., Lt., USN
HUNTER, Patrick R., Capt., USAF
HUNTER, Robert C., Jr., Col., USA
HUNTON, Donald B., Capt., USAF
HUSZAR, Robert J., Capt., USAF
IDELSON, Malcolm G., Capt., USAF
IGO, Robert P., Capt., USAF
JACKSON, Frederick E., Lt., USN
JACOBS, Bertrand R., Capt., USA
JANULIS, Alexander T., Lt., USN
JEFFERSON, Samuel C., Capt., USA
JESSEN, Donald A., Jr., Capt., USAF
JOCHIMSEN, Earl H., Lt., USN
JOERNS, Frederick O., Maj., USA
JOHNSON, Waine C., Capt., USA
JOHNSTON, Howard H., Capt., USAF
JONES, Phillip H., Capt., USAF
JONES, Richard A., Capt., USAF
JONES, Robert O., Lt., USN
JONES, Thomas H., Jr., Lt., USN
KAPLAN, Harold L., Capt., USAF
KELLER, Niklaus J. A., Maj., USA
KENNEY, David B., Capt., USAF
KENT, Alfred H., Capt., USA
KERN, Stanley R., Capt., USAF
KITCHEN, Lloyd, Maj., USA
KLEIN, Elmer P., Capt., USAF
KLINE, Stanley S., Lt., USN
KNIGHT, Ronald M., Capt., USAF
KNOX, Gaylord S., Capt., USA
KNOX, Paul R., Lt., USN
KOPPISCH, Arthur R., Capt., USAF
KORTIS, Howard I., Capt., USA
LANGSJOEN, Per H., Maj., USA
LARSON, Norman E., Capt., USAF
LATHROP, Donald D., Capt., USAF
LAVIN, Sheldon E., Lt., USN
LAWLER, William H., Jr., Lt., USN
LEMIEUX, Gerald E., Capt., USAF
LEY, Herbert L., Jr., Lt. Col., USA
LICATA, Joseph J., Capt., USAF
LIDDELL, Charles K., Lt. Col., USA
LOGAN, George W., Capt., USAF
LOMAN, Arthur J., Jr., Lt., USN
LONG, Thomas P., Lt., USN
LONGFELLOW, Don W., Capt., USA
LORINCZ, Albert B., Lt. Col., USA
LOURIE, Herbert, Capt., USAF
LOURO, Jose M., Capt., USA
LUDWIG, James M., Jr., Capt., USA
LUTZ, Robert J., Capt., USAF
MABIE, Paul D., Lt., USN
MABRY, Edward B., Capt., USAF
MacNAIR, Donald S., Capt., USA
MADDOX, Henry E., III, Capt., USAF
MAHIN, Dorsey T., Capt., USA
MANNICK, John A., Capt., USAF
MANSFIELD, John O., Capt., USA
MAPPUS, Theodore W., Jr., Capt., USAF
MARSH, Charles E., Capt., USAF
MARSHALL, William H., Lt., USN
MAXWELL, John W., Jr., Capt., USAF
MAYORAL-BIGAS, Jorge W., Capt., USAF
McCAGUE, John J., Jr., Capt., USAF
McCLAIN, Harry C., Col., USA
McCUMBER, Myron L., Capt., USAF
McDANIEL, Leroy W., Capt., USAF
McFADDEN, Archibald W., Capt., USA
McGERITY, Joseph L., Capt., USA
McGREGOR, John G., Jr., Capt., USA
McLEOD, Donald G., Jr., Maj., USA
MEIJER, Henry P., Capt., USAF
METZGER, Joseph F., Maj., USA
MICHAEL, James D., Capt., USAF
MILLER, Frank L., Lt. Col., USA
MOFFETT, James B., Lt. Col., USA
MORANVILLE, Benedict A., II, Capt., USAF
MORRIS, Harold E., Capt., USAF
MUELLER, Harold W., Maj., USA
MURRAY, Walter C., Capt., USAF
MUSTELIER, E. R., Capt., USA
MYERS, Richard L., Capt., USAF
NEIMAN, Watson F., Col., USA
NELSON, Thomas G., Maj., USA
NEUSTADT, Jerome E., Capt., USAF
NEWIRTH, Frederick J., Capt., USAF
NORRIS, Louis J., Jr., Lt., USN
NUTTALL, James B., Col., USAF
O'BRIEN, James D., Lt., USN
O'CONOR, Vincent J., Jr., Capt., USAF
OFFICER, Charles D., Lt., USN
O'HARA, Edward F., Capt., USAF
OKEL, Benjamin B., Lt., USN
OLICKER, Stanley D., Capt., USAF
OLINGER, Sheff D., Capt., USA
OLINGER, William F., Capt., USAF
OLIVE, John W., Capt., USAF
OLSON, William R., Lt., USN
OMER, George E., Jr., Maj., USA
ORIMO, Kazuo, Capt., USA
ORSON, Jay M., Capt., USAF
ORTH, Robert H., Capt., USAF
OVERMAN, Richard H., Capt., USAF
OVEREND, Donald S., Lt., USN
OWEN, Cannon A., Col., USA
OWEN, Russell H., Lt., USN
OWENS, Lloyd E., Capt., USAF
PAGE, Jesse W., Capt., USAF
PALMER, David B., Capt., USAF
PARRIS, Alva E., Capt., USAF
PARRISH, Matthew D., Maj., USA
PASS, Bertram R., Lt., USN
PATTEN, Robert C., Capt., USAF
PAULISSEN, James P., Capt., USAF
PAVLIC, Robert S., Capt., USAF
PEARSON, Jack W., Capt., USA
PEGUES, Josiah J., Capt., USAF
PETERS, Richard E., Capt., USAF
PETERSON, Eric M., Capt., USAF
PHILIPP, Louis D., Capt., USAF
PIERARD, Albert A., Capt., USAF
PINCHUCK, Arthur L., Capt., USAF
PIPER, Clinton A., Maj., USA
PIRTLE, George W., Jr., Capt., USAF
POGREBNIAK, Alexander, Capt., USA
POPE, James K., Maj., USA
POULSOM, Edwin D., Capt., USAF
PRICE, Frank W., Capt., USA
PRICE, Ira B., Capt., USA
PUTNAM, William D., Capt., USAF
RAMEY, James W., Capt., USAF
REEVE, Arnold M., Maj., USA
REIFERT, James M., Lt., USN
REID, Robert L., Capt., USAF
REYES-DAVILLA, Jose M., Capt., USAF
REYNOLDS, James L., Capt., USAF
RICHARDSON, Joseph B., Capt., USAF
RICHARDSON, William L., Maj., USA
ROBERTI, Nicholas E., Capt., USAF
ROBERTS, Curtis D., Capt., USAF
ROBERTS, Robert R. R., Lt., USN

ROBINS, John C., Lt., USN
ROBINSON, Benjamin, Capt., USAF
ROBINSON, Phelps M., Capt., USAF
ROCKWELL, W. R., Capt., USA
ROGERS, James T., Col., USA
ROSATO, Edward J., Capt., USAF
ROSENBAUM, Joseph, Capt., USAF
ROTHENBERG, Herbert J., Capt., USAF
ROWEN, Burt, Lt. Col., USAF
RUDOLPH, Burton M., Capt., USAF
RYAN, James H., Capt., USA
SALVAGGIO, Anthony T., Capt., USAF
SANCHEZ, Quinones A., Capt., USA
SATO, Kenneth K., Capt., USAF
SCHOOLS, George S., Capt., USA
SCOTT, Norman Mcl., Jr., Lt. Col., USA
SEITZMAN, Leonard H., Lt. Col., USA
SENFT, Otto E., Capt., USAF
SHADEL, W. F., Jr., Capt., USA
SHANNON, Frank J., Jr., Lt. Col., USA
SHELLER, Monna M., Capt., USA
SIMON, Robert, Capt., USAF
SISLER, David A., Capt., USA
SKAGERBERG, David G., Capt., USAF
SKEMP, Joseph J., Capt., USAF
SMELSEY, Samuel O., Lt. Col., USAF
SMULYAN, Harold, Capt., USAF
SORENSEN, Richard F., Capt., USAF
SPARKS, John C., Capt., USAF
SPITZNAGEL, John K., Lt. Col., USA
STANISLAO, Mario A., Capt., USA
STEEL, Maxwell W., Jr., Lt. Col., USAF
STEIDINGER, Charles L., Capt., USAF
STEPHENS, Wesley G., Capt., USAF
STEPHENS, William A., Maj., USA
STEWART, Jonas H., Capt., USAF
SULAK, Michael H., Maj., USA
SWITZER, Walter E., Maj., USA
TAUSCHER, John W., Capt., USAF
TAYLOR, Mallie C., Capt., USAF
TESSMER, Carl F., Col., USA
THOMAS, Herrick M., Lt. Col., USAF
THURSTONE, Conrad G., Capt., USAF
TIETBOHL, Ralph H., Jr., Lt., USN
TIRMAN, Robert M., Lt. Col., USAF
TISDALE, S. A., Jr., Capt., USA
TRACY, Frank L., Lt., USN
TRACY, Harold W., Jr., Lt., USN
TRIEDMAN, Leonard J., Capt., USAF
UMLAUF, Harry J., Jr., Lt. Col., USA
VANDERMARK, Harry L., Capt., USA
VIGODA, Philip S., Capt., USAF
VINEYARD, William R., Maj., USA
VINSON, Harold A., Col., USA
VITU, Robert L., Capt., USA
VULTEE, Frederick E., Jr., Maj., USA
WAGENBACH, William F., Jr., Maj., USA
WAGNER, William J., Lt., USN
WALCHENBACH, Roy P., Lt., USN
WEINTRAUB, Howard, Capt., USAF
WHELAN, Thomas J., Jr., Lt. Col., USA
WIEMER, Robert A., Lt. Col., USAF
WILKINS, John H., Lt. Col., USAF
WINTER, William C., Jr., Lt. Col., USAF
WOOLLCOTT, P., Jr., Capt., USA
YANEY, Ralph D., Capt., USAF
YERG, Raymond A., Lt. Col., USAF
YOUNG, James F., Capt., USAF

DENTAL CORPS

ADDUCI, Peter C., Capt., USAF
AIKEN, Daniel S., Capt., USA
AIRALL, Guillemo E., Capt., USA
ALEXANDER, Philip B., Capt., USAF
ALEXANDER, William, Capt., USA
ALLMAN, Charles A., Jr., Capt., USAF
ANDERSON, Kenneth J., Capt., USAF
ATTAWAY, Hugh E., Capt., USA
BANGERT, Sherman G., Capt., USA
BARRON, Donald G., Capt., USA
BECK, Charles H., Capt., USA
BECKER, Clement P., Capt., USA
BELLAN, Irwin E., Capt., USAF
BELLO, John R., Capt., USAF
BETZ, Peter K., Capt., USA
BITTLINGMAIER, W. H., Capt., USN
BOARD, Hal J., Capt., USA
BOTTOMLEY, Leroy N., Capt., USAF
BOYKIN, Thomas C., Capt., USAF
BRACE, Richard M., Capt., USA
BRAYNON, Edward, Jr., Capt., USAF
BROWN, Alfred A., Capt., USA
BUNDT, Lyle D., Capt., USA
BURFORD, Richard S., Capt., USA
BURNS, Palmer J., Capt., USAF
CARR, John, Capt., USA
CAVANAUTH, John J., Capt., USA
CHERNY, Roman C., Capt., USA
CILUFFO, William E., Capt., USA
CLARKE, Theodore C., Capt., USA
CLEMENS, Kenneth M., Capt., USA
COHEN, Leonard W., Capt., USAF
COLLINS, Ronald E., Capt., USAF
COSTA, Arthur C., Capt., USA
COSTELLO, John P., Capt., USAF
CRAIN, William O., Capt., USA
CUVJAN, Simon, Capt., USAF
DASENT, Eugene M., Lt. Col., USA
DAVIDSMEYER, J. R., Capt., USAF
DAVIS, Quince B., Capt., USA
DEITCH, Stanton, Capt., USAF
DENU, Philip E., Jr., Capt., USAF
DOBSON, Charles W., Capt., USA
DOMAN, Eugene B., Capt., USAF
DONAHUE, Michael J., Capt., USAF
DUSCH, James G., Capt., USAF
EBNER, Deane A., Capt., USA
EDWARDS, Norman J., Capt., USA
FETTERS, Max E., Capt., USA
FISHER, Harold, Capt., USAF
FISHMAN, Norton, Capt., USAF
FLENNIKEN, Melvin E., Capt., USA
FOX, Stanley W., Capt., USAF
FRASER, Douglas R., Capt., USAF
FREDLUND, Richard J., Capt., USAF
FREEDMAN, Edward S., Capt., USA
FROME, William J., Capt., USAF
FUJIMOTO, Royce Y., Capt., USA
GALBREATH, Jess C., Capt., USAF
GATES, Harlan, II, Capt., USAF
GHENT, Ira W., Lt. Col., USA
GOODMAN, Thomas K., Lt. Col., USA
GORDON, Arnold M., Capt., USAF
GRAHAM, George G., Capt., USAF
GRAVES, Richard C., Capt., USAF
GRUBER, Rolf G., Capt., USAF
HALLGREN, Charles W., Capt., USAF
HANSON, Jay G., Capt., USA
HARLESS, Charles F., Jr., Capt., USAF
HOLSTEAD, Hermon G., Capt., USAF
HOLSTEIN, Harris F., Capt., USAF
HOOBER, Rodney R., Capt., USAF
HOWE, Michael J., Capt., USA
HULL, Robert H., Capt., USAF
HUNSUCK, Ervin E., Capt., USAF
HURT, Clifton H., Capt., USA
IRISH, Robert L., Capt., USAF
IVEY, Paul E., Capt., USA

JACOBY, James K., Capt., USA
JANS, Jack F., Capt., USAF
JASON, Alan D., Capt., USAF
JENNINGS, William A., Capt., USA
JEWELLS, Robert W., Capt., USA
JOHNSON, Dale B., Maj., USA
JONES, Edward, Maj., USAF
JONES, James C., Capt., USAF
JONES, Kenneth F., Capt., USA
KAHLER, John T., Jr., Capt., USAF
KAMINSKI, Leonard, Capt., USAF
KAPLAN, Donald, Capt., USAF
KARASH, Gilbert, Capt., USAF
KELNER, Lester D., Capt., USAF
KIRCHHOFER, Melvin L., Lt. Col., USA
KLEINMAN, Preston R., Capt., USA
KLOB, John J., Capt., USAF
KRIZAN, Stephen G., Capt., USA
KRUEGER, Richard W., Capt., USAF
KUHL, Robert J., Capt., USA
KURTIS, Louis T., Capt., USA
KURTZ, Robert S., Capt., USA
LANE, Richard A., Capt., USA
LARDER, John S., Capt., USAF
LEE, Dennis G., Capt., USA
LEE, Peter H., Capt., USA
LEONARD, Craig H., Capt., USAF
LEONE, Anthony R., Capt., USA
LETTES, Merwin, Capt., USA
LIDGE, Ernest F., Jr., Capt., USAF
LOMBARDI, Richard E., Capt., USA
LONG, John M., Capt., USA
LOO, Richard W. L., Capt., USA
LOUIE, Edward C., Capt., USA
LYTWYN, William J., Capt., USAF
MAHAN, John C., Jr., Capt., USAF
MANDRACCHIA, D. P., Capt., USA
MANON, Joseph P., Jr., Capt., USA
MARDER, Ira B., Capt., USA
MAROTTA, Michael J., Capt., USAF
MARTEL, Charles E., Capt., USAF
MAXEY, Richard S., Capt., USA
MAXWELL, Edwin L., Capt., USAF
MAYDEN, J. Robert, Capt., USAF
McDONALD, James T., Jr., Capt., USAF
McGEE, John P., Jr., Capt., USA
MENELL, Howard B., Capt., USAF
MIENER, Clyford A., Capt., USAF
MILLER, Charles D., Capt., USAF
MILLER, Claude R., Jr., Capt., USA
MILLER, Don L., Capt., USAF
MILLIGAN, Vernon L., Capt., USAF
MITCHELL, John E., Capt., USAF
MIYAHARA, Richard I., Capt., USA
MOFFETT, Coleman J., Lt. Col., USA
MONTEMAYOR, G., Capt., USAF
MONTGOMERY, Robert W., Capt., USA
MURDOCK, Donald K., Capt., USAF
MURRET, Charles W., Capt., USAF
NACHT, Arthur L., Capt., USAF
NAGELE, Thomas E., Capt., USAF
NAGY, Alexander J., Capt., USA
NARDINE, John V., Capt., USA
NEIE, Horst W., Capt., USA
NICHOLS, Wharton A., Capt., USAF
NIEDHAMER, A. C., Capt., USAF
NISHMAN, Leonard M., Capt., USAF
NOBLE, Richard J., Lt. Col., USA
NORTHERN, William, Capt., USA
NORVAL, John C., Capt., USA
O'BRIEN, Eugene T., Capt., USAF
ORNSTEIN, David, Lt. Col., USA
OSBON, Donald B., Capt., USAF
PASKOW, Sanford, Capt., USAF
PEDERSEN, Gordon W., Capt., USA
PLOTNIK, Golbert, Capt., USAF
POLLARO, Vincent J., Capt., USAF
RAMIREZ, DeArellan, Capt., USA
RAMNARINE, Krishna, Capt., USA
RAWLINS, Sedrick J., Capt., USA
REED, Robert C., Capt., USAF
REH, Christian F., Lt. Col., USA
RIEGER, Seymour J., Capt., USAF
RODGERS, Robert C., Capt., USAF
ROSS, Murray, Capt., USAF
ROWLEY, Neil L., Capt., USAF
RUSSELL, Richard B., Capt., USA
SAFAR, Milo R., Capt., USA
SALOMONE, Gregory J., Capt., USA
SCHINDLER, James P., Capt., USAF
SCOLAMIERO, Dominic F., Capt., USAF
SEAMAN, Charles D., Capt., USAF
SHEPARD, Walter L., Capt., USAF
SIMONDS, George N., Capt., USAF
SIMONS, Sheldon, Capt., USAF
SINROD, Harold S., Capt., USAF
SKONEY, Daniel J., Capt., USA
SMITH, Harold D., Capt., USA
SMYTHE, Jack A., Capt., USAF
SNEAD, Moses P., Capt., USAF
SPARGO, William D., Capt., USA
SPENDLOVE, Clark, Capt., USA
SQUIRES, Robert L., Capt., USA
STAEUDLE, Heinz H., Capt., USA
STEEL, Robert E., Jr., Capt., USA
STERN, Gershon A., Capt., USAF
STEWART, Hugh A., Jr., Capt., USA
STEWART, Robert A., Capt., USAF
STOPHERD, John M., Capt., USA
STORY, Donald N., Capt., USAF
STOSICH, Kenneth E., Capt., USAF
STOVER, Donald R., Capt., USAF
STRAUSSBERG, Arthur, Capt., USAF
STRIZAK, Harvey E., Capt., USA
STYER, Donald J., Lt. Col., USA
SULLIVAN, James D., Capt., USAF
SULLIVAN, Robert B., Capt., USA
SURILLO, Feliciano, Capt., USA
SWENSON, Ralph D., Capt., USAF
SWIFT, Robert F., Capt., USAF
TAYLOR, Roy M., Capt., USAF
THOMPSON, Calvin W., Capt., USA
THOMPSON, Maceo B., Capt., USAF
THOMPSON, William J., Capt., USA
TOMPKINS, I. E., Jr., Capt., USA
TOOVY, Samuel, Capt., USAF
TORRES-BERRIOS, C. A., Capt., USA
TSCHUDY, Robert M., Capt., USAF
UNDERWOOD, Robert J., Capt., USAF
UTTERBACK, Robert, Capt., USA
VANACEK, Russell J., Capt., USAF
VOLATILE, Michael T., Capt., USAF
VUKOVICH, Frank R., Capt., USAF
WACHS, Morton J., Capt., USAF
WAGLEY, Philip C., Lt. Col., USA
WALDROP, Dennis W., Capt., USA
WALL, Frank H., Capt., USAF
WALLEY, Roman J., Lt. Col., USA
WEBB, Walter D., Capt., USAF
WEIR, Joseph V., Capt., USA
WEISNER, Henry J., Lt. Col., USA
WHITESIDE, W. D., Jr., Capt., USA
WILLIAMS, Edward C., Capt., USA
WINOKUR, William, Capt., USA
WOOD, Robert D., Capt., USA
WOODBURY, Douglas C., Capt., USAF
WRIGHT, Charles I., Capt., USA
YOUNG, John J., Capt., USA
ZIGRANG, Richard C., Capt., USA
ZOBL, Robert J., Capt., USA

NEW OFFICERS OF MILITARY MEDICINE SECTION, A. M. A.

At the recent meeting of the Section on Military Medicine, Scientific Assembly of the American Medical Association, held in June 1956, in Chicago, Ill., the following officers were appointed to serve for the 1956-1957 term:

Russel V. Lee, M. D., Palo Alto Clinic, Palo Alto, California (Chairman)

Silas B. Hays, Major General, MC, USA, Surgeon General, U. S. Army (Vice Chairman)

Cecil L. Andrews, Captain, MC, USN, Bureau of Medicine and Surgery (Secretary)

Charles L. Leedham, Colonel, MC, USA (Ret.) (Delegate to Section on Military Medicine)

MAYO CLINIC SURGEON APPOINTED REAR ADMIRAL, U. S. NAVAL RESERVE

Dr. Waltman Walters, head of a section of Surgery at the Mayo Clinic, Rochester, Minn., became the third member of that clinic staff to achieve the rank of Rear Admiral in the U. S. Naval Reserve. Dr. Walters served as Chief of Surgery at several U. S. naval hospitals and as consultant to the Third Fleet in the South Pacific.

Dr. Waltman Walters, right, receiving his commission as Rear Admiral, U. S. Naval Reserve. On the left is Rear Admiral Walter F. James, MC, USN, District Medical Officer, Ninth Naval District. Also attending the ceremonies are two other Mayo Clinic staff members: W. McK. Craig (second from left) and T. B. Magath, both Rear Admirals, MC, U. S. Naval Reserve.

NEW AIR FORCE HOSPITAL IN BERMUDA

FRANK b. BERRY, M. D.
Assistant Secretary of Defense (Health and Medical)

THIS most felicitous occasion calls to mind that hardy band, the Adventurers of Bermuda, who first settled here almost three and a half centuries ago. Personally, it takes me back 30 years when I first set foot upon this enchanted soil of Caliban. Although we hear much in the papers these days of rock and roll and the young, I assure you that those of us who came to Bermuda in earlier days were well aware even then of the significance of that phrase, as we rocked, rolled, and pitched on the S. S. *Fort George*—and of our relief as we passed Murray's Anchorage and reached the quiet haven of the harbor. A few years later there were the happier days of the "Monarch" and the "Queen," which with their added beauties and refinements assuaged even the discomforts of the restless gulf stream. I look back upon those years with great fondness because then you had your beautiful cedars, the island was quiet, and there were no automobiles.

Twenty years intervened, until one day last December I landed here at this base with representatives of the offices of our three Surgeons General, members of my Council, and others from our Department of Defense. We were most cordially and generously received by Colonel

Excerpt from address at the dedication of the new hospital, Kindley Air Force Base, Bermuda, 21 June 1956.

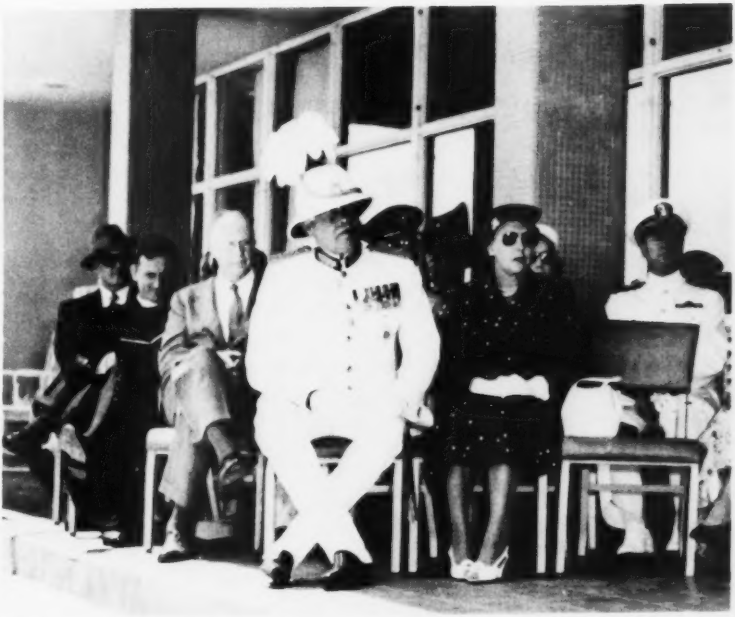
Peterson and his Command at Kindley Air Force Base. Naturally, we were most interested in the building of this beautiful new hospital that we are here to dedicate today.

Dedicatory address is presented by Doctor Frank B. Berry, Assistant Secretary of Defense (Health and Medical).

We trust that it will serve as another tie in our enduring friendship. We know it will care for our Air Force and Navy, and we hope it may also prove to be a boon and symbol of mercy to you in Bermuda, always ready to provide for you as it does for our own, should ever the need arise. We pray that this may never happen in any large sense, but we realize that our lives are fraught daily with the dangers of illness and accident, and you may be sure that this hospital will always be willing to render aid to you of these islands and to those of our brothers in arms from the United Kingdom who may be stationed here.

During the war years and ever since, we have been grateful for your assistance and understanding in the need for outlying stations in the defense of our world. In this world today, more restless even than the seas about you and overwhelmed by two severe storms within my own period of adult life, we and our kith and kin must always stand together and work shoulder to shoulder to maintain that freedom and free interchange which is inherent within you and within us; and by so doing we

hope that we may bring about a more tranquil and peaceful world with right morals, strength, and a spirit of fellowship among men.



Distinguished guests at the dedication included His Excellency the Governor of Bermuda, Lieutenant General Sir John Woodall, K. B. E., C. B., M. C.; Doctor Frank B. Berry, Assistant Secretary of Defense (Health and Medical); Rear Admiral Bruce E. Bradley, MC, USN, Deputy Surgeon General, U. S. Navy; and Major General William H. Powell, Jr., USAF (MC), Deputy Surgeon General, U. S. Air Force.

The new hospital at Kindley Air Force Base is of modern design and has many attractive features. All areas directly serving patients are air conditioned, the public corridors are lined to a height of five feet with a washable plastic material, and fluorescent lighting is installed throughout. A music distribution system feeds four separate music or radio programs into earphones or pillow speakers at each bed, with selector switches individually operated. Every bed is provided with an audiovisual nurses' call system connected with the primary nurses' station. This allows for a two-way conversation between patient and nurse, thereby saving the nurse many steps and making possible more efficient and prompt service to the patient. There also is an interoffice communication system linking the major professional and administrative offices of the hospital.—*Editor*

CORRESPONDENCE

To the Editor:—I think it should be called to the attention of your readers that Major Joseph Crampton's statement regarding the diagnosis in the case of systemic lupus erythematosus, presented in the CPC on Page 695 of the May 1956 issue of the *U. S. Armed Forces Medical Journal,* to the effect that the presence of bullous skin lesions in systemic lupus erythematosus "constitute the picture that we term the Senear-Usher syndrome," is based on a misapprehension.

This point of confusion was commonplace during the early years of discussion of the nature of the Senear-Usher syndrome. It was beginning to be apparent as long ago as 1940, however, and has been firmly established during the past ten years, that the occurrence of bullous lesions in systemic lupus erythematosus is merely an occasional manifestation of that protean disease, and has nothing whatever to do with the Senear-Usher syndrome. The latter is merely a variety of pemphigus, now known properly as pemphigus erythematosus. It bears no relationship whatever to lupus erythematosus except for the not infrequent clinical mimicry of facial lesions of discoid lupus erythematosus, especially during early phases of the disease. If any reasonable evidence of lupus erythematosus can be established in patients thought originally to have the Senear-Usher syndrome or pemphigus erythematosus, the diagnosis then *becomes* lupus erythematosus and the diagnosis of pemphigus, or Senear-Usher syndrome, is discarded.

HARRY L. ARNOLD, Jr., M. D.
Straub Clinic
Kapiolani Street
Honolulu 14, T. H.

Reviews of Recent Books

THE CYTOLOGY AND LIFE-HISTORY OF BACTERIA, by *K. A. Bisset,* D. Sc. 2d edition. 164 pages; illustrated. The Williams and Wilkins Co., Baltimore, Md., 1955. Price $6.

In this monograph the author discusses technic, structures of bacteria, reproduction and life cycles, macroformations, and the evolutionary relationships and genetics of bacteria. The chapter on technic describes various procedures for mounting and staining of bacteria and electron and phase microscopy in general rather than specific terms. Surface structures and the bacterial nucleus are covered in separate chapters. The discussion and illustrations of the cell wall and cell membrane and their behavior during cell division are most interesting, as is the material presented on flagella. The chapters on reproduction and sexuality in bacteria cover the various processes whereby propagation is accomplished. Vegetative reproduction may be simple or complex, asexual or sexual. Of special interest to the reviewer was the chapter on the evolutionary relationships of bacteria, particularly the concept that bacteria evolved parallel with other groups of living organisms from an aquatic to a terrestrial mode of life and that the spirillum is the most primitive and most probable ancestral bacterial form.

Throughout the book the text is accompanied by excellent photomicrographs and line drawings which admirably illustrate the material covered. Each chapter has a brief summary and is followed by a bibliography. Most of the references cited are recent, within the past 20 years, attesting to the increasing interest in the finer structures and life histories of bacteria.

Although this volume offers little of immediate practical value to the physician, those who are interested in medicine in its broadest aspects can read it with pleasure and profit. The book is recommended for the laboratory worker, particularly the bacteriologist.

—*HUGH B. HOEFFLER, Lt. Col., MC, USA*

IONIC INTERPRETATION OF DRUG ACTION IN CHEMOTHERAPEUTIC RESEARCH, by *Alexander V. Tolstoouhov,* M. D., Ph. D. 276 pages; illustrated. Chemical Publishing Co., Inc., New York, N. Y., 1955. Price $10.

This overpriced monograph is a compilation of data from a wide variety of sources and is presented by the author as evidence supporting his thesis that relative biologic action is determined by such physiochemical properties of compounds as dissociation constants, isoelectric points, and solubilities; he questions the validity of structural relationships as controlling relative activity of drug series. His idea has interesting and appealing points but is not clearly nor felicitously de-

veloped, nor is it apparent why, from his point of view, all substances with the same isoelectric point, for example, do not have the same biologic action. In many instances the locutions employed suggest that English is not the first language of the author. Some citations in the bibliography are inconsistent, and some entries show carelessness or lapses in proofreading. — *ELIZABETH R. B. SMITH, Ph. D.*

THE HOUSE PHYSICIAN'S HANDBOOK, by *C. Allan Birch,* M. D., F. R. C. P. 160 pages. The Williams & Wilkins Co., Baltimore, Md., 1955. Price $3.

This little pocket-size book contains a considerable amount of information relative to the day-to-day tasks of the house physician. It is well made and the print is large and clear. The over-all size of the volume is 5 by 7½ inches. It contains many charts and tables, including one of words and phrases in English, French, German, and Italian, which may be used by the physician faced with a patient who speaks no English.

Although it was written primarily for the house physician in Great Britain, most of the material is applicable here. It begins with some information on the general duties, etiquette, and conduct of the house physician and includes material on clinical procedures, clinical pathology, and treatment. Some of the material is not usually found in handbooks of this kind. For example, it contains information concerning the following: deathbed wills, dying depositions and declarations, embalming, baptism (emergency baptism by the physician), bleeding tooth socket, fixed wedding ring, and tracheotomy (emergency). Much of the material is so basic, however, that this volume would be more useful to the medical student and intern than to the resident physician. —*WILLIAM C. MARETT, Lt. Col., USAF (MC)*

TEXTBOOK OF OCCUPATIONAL THERAPY, With Chief Reference to Psychological Medicine, by *Eamon N. M. O'Sullivan,* M. B., D. P. M. 319 pages; illustrated. Philosophical Library, Inc., New York, N. Y., 1955. Price $10.

It is important for those who are searching for reference material in occupational therapy to note particularly the subtitle of this book. The author deals almost entirely with psychiatric occupational therapy. Although occasional references are made to medical, surgical, and orthopedic problems, these are not discussed in any detail. The opening chapter on the history of occupational therapy is interesting and informative.

Although this book is of a reference and technical type, it is easy to read. Dr. O'Sullivan has a pleasing and striking descriptive ability in his writing, which may be illustrated by his use of the following analogy. The point of discussion is to emphasize the importance and recognition of occupational therapy as a therapeutic agent. "The curative aspect is to occupational therapy what the soul is to the body. It is the vital principle which gives life and without which the treatment is no

longer a treatment—it is merely an inanimate body, which is devitalized, inert, and useless. The soul or therapy is gone and the lifeless body or occupation is all that remains."

Most activities for patients mentioned in this book have to do with the industry and maintenance of a large institution. Too often this type of occupational therapy can be mistreated and the therapeutic value for the patient is overshadowed by the economic needs of the institution. The author illustrates how both may be accomplished effectively through proper organization, administration, and supervision.

—*ELIZABETH M. NACHOD, Capt., AMSC, USA*

ANNALS OF THE NEW YORK ACADEMY OF SCIENCES, Volume 60, Art. 6, Pages 807-964, April 30, 1955. Editor: *Roy Waldo Miner.* "Instrumentation." Conference Chairman and Consulting Editor: *Joseph Greenspan.* 157 pages; illustrated. The New York Academy of Sciences, New York, N. Y., 1955. Price $3.

This booklet is a very brief but good attempt by 16 contributors to describe the vast field of instrumentation in a philosophic, theoretic, and somewhat practical manner. The booklet is divided into three parts:

Part I, "The Science of Instrumentation" (26 pages), is purely philosophic and explains how human attributes and limitations prevail in the design and use of instruments for specific purposes.

Part II, "The Transmission of Instrument Requirements and Specifications" (40 pages), is mainly theoretical and could have been condensed. This part also tends to be practical in describing specific instruments for biologic use. The contribution by Grundfest may be of interest to those working in electrocardiography, neurophysiology, and related fields because he describes the theory of the process of bioelectric potential production and how it is detected.

Part III, "Some Examples of the Use of Analog Instruments" (87 pages), is the most practical part of the booklet. This section shows how models, electrical and electronic circuits, and other methods can be used to set up analogous systems to explain various phenomena in other fields. Methods such as the use of surgical rubber dam sheet stretched and sagged into some special shape with special lighting effects, an electrolytic tank, a running layer of water containing slowly-dissolving crystals of permanganate, all to obtain equipotential lines, et cetera, are described as a means of explaining various natural phenomena and solving mathematical problems. A very brief summary of transducers (converters of energy into current and voltage) is included, as could be expected.

The booklet in a general way expresses the idea that in order for man to understand and improve his environment and himself, he should be able to apply what he can easily understand and master in one field to what is difficult for him in another field, specifically the biologic

field. Imagination, man's unique and most precious gift, is his most important tool in performing these processes of comparison, elimination, differentiation, et cetera, that are so useful in natural philosophy. A great number of scientific theories, developments, and inventions have been made based on imaginative thinking and making analogies. One specific example of drawing analogies is giving to the atom, which man has not actually seen, a structure like our solar system, and from this bit of imagination atomic energy is obtained!

The booklet is not intended for study or for explaining electronics, et cetera, in detail. The average physician would not be interested in it, but it could be recommended to him for a few quiet evenings.

—*IRVIN LEVIN, Ph. D.*

ANNALS OF THE NEW YORK ACADEMY OF SCIENCES, Volume 60, Art. 5, Pages 541-806, April 27, 1955. Editor: *Roy Waldo Miner.* "Recent Advances in the Study of the Structure, Composition, and Growth of Mineralized Tissues." Conference Co-Chairmen: *Roy O. Greep* and *Albert E. Sobel.* Consulting Editor: *Roy O. Greep.* 265 pages; illustrated. The New York Academy of Sciences, New York, N. Y., 1955. Price $4.

This is a series of papers published as a result of a conference on mineralized tissues held by the Section of Biology of the New York Academy of Sciences. It brings together an imposing group of experts in the field of electron microscopy, x-ray diffraction, histochemistry, radiobiology, and microchemical and crystallographic methods of analysis of the mineralized tissues.

These papers reveal the dynamics of the calcified tissues. Each paper illustrates clearly and concisely how the essential elements are constantly turned over and renewed within the skeleton and the teeth. They metabolize, adapt, and respond. They are constantly undergoing change, and contribute with remarkable facility to the ionic equilibrium of the body fluids.

This book paints as definitive a picture as is possible of the present state of knowledge concerning the mineralized tissues. An exchange of ideas is presented that may spotlight new paths of investigation.

This is an excellent reference book for investigators interested in this field. The complete bibliography following each paper enhances its value to the interested investigator.

—*THEODORE E. FISCHER, Col., USAF (DC)*

ANNALS OF THE NEW YORK ACADEMY OF SCIENCES, Volume 61, Art. 4, Pages 737-1064, September 27, 1955. Editor: *Roy Waldo Miner.* "Biology of Poliomyelitis." Conference Chairman and Consulting Editor: *Karl Habel.* 328 pages; illustrated. The New York Academy of Sciences, New York, N. Y., 1955. Price $5.

This collection of papers is the result of a conference on the biology of poliomyelitis, sponsored by the Section on Biology, New York Academy of Sciences, in January 1955. It consists of 37 individual papers,

each by an authority in the field, which are organized into the following major groupings: Part 1. Poliomyelitis Virus and Methods for Its Study. Part 2. Susceptibility of Cells and Organisms to Poliomyelitis. Part 3. Poliomyelitis Virus Variation. Part 4. Poliomyelitis Virus and the Community. Part 5. Immunization Against Poliomyelitis.

As might be suspected from the main group titles, these papers are not for casual reading. Parts 1, 2, and 3 will have little appeal to the majority of physicians interested in clinical medicine, but provide an extremely compact and authoritative reference source for those having a greater interest in the basic laboratory problems related to the diagnosis and prevention of poliomyelitis. Papers in parts 4 and 5 should be read by every physician who is in clinical practice, as they illustrate most of the basic principles of epidemiology and immunology of the disease. Of particular importance are the longitudinal studies of Hammond and his colleagues on Navy families in the Philippines, which illustrate so well the high infection rates without clinical illness. The final paper by G. S. Wilson outlines many of the still unanswered questions and problems, and predicts those things that may come within the next three decades.

This is a book that belongs in every medical library.

—JOHN R. SEAL, Capt., MC, USN

200 MILES UP, The Conquest of the Upper Air, by *J. Gordon Vaeth*, Head, New Weapons and Systems Division, U. S. Navy Special Devices Center, Office of Naval Research. 2d edition. 258 pages; illustrated. The Ronald Press Co., New York, N. Y., 1955. Price $5.

This second edition of this book modernizes an absorbing account of the history and current program of the United States in upper air research and flight at extreme altitudes. The reader is first introduced to the physical characteristics of the great air ocean around us, from the earth's surface to the estimated top of the atmosphere, 200 miles or more aloft. The instruments and scientific methods used to measure physical and chemical phenomena such as atmospheric composition, winds, pressures, temperatures, ion densities, solar radiation, cosmic radiation, and meteors receive a careful and pleasingly lucid treatment. Special sections of the book are devoted to the vehicles used for this research—the 120,000-foot Skyhook balloon, the V-2, Aerobee, and Viking sounding rockets. One learns details of their construction, power supply, control methods, instrumentation, and flight capabilities as well as a concept of the scientific data that have been won by means of these spectacular devices. The author includes stimulating accounts of the principal scientists involved, stories of human drive, vision, tenacity, and frank heroism in this technical crusade toward space. Excellent photographs and diagrams abundantly illustrate the text.

Two especially noteworthy chapters bring the story to a close. One describes the United States' program to build and fire into its orbit sometime in 1957 or 1958 the first (we hope) artificial, unmanned earth

392347 O - 56 - 10

satellite. Designed to circle the globe some 200 to 300 miles up at a velocity of 5 miles per second, this unique device will observe and transmit to ground receiving stations an astonishing variety of scientific data such as solar and cosmic radiation, aurora particles, earth's cloud cover, and meteor dust impacts. The closing chapter is a thought-provoking forecast of man's technical progress which will eventually lead to true space travel. Overcoming obstacles in an orderly way, says the author, man one day will almost certainly realize his great dreams of interplanetary and interstellar travel. The foundations of this ultimate achievement are the world's programs of research and development —past, present, and planned. The singular importance, in this respect, of the research described is immediately apparent.

200 Miles Up is written in a clear, easy style which should make it equally appealing to the layman, the student, and to specialists in other scientific fields who want to familiarize themselves with the inspiring and challenging frontier located at such a relatively short distance straight up.—*JOHN M. TALBOT, Col., USAF (MC)*

A DICTIONARY OF TERMS IN PHARMACOGNOSY, AND OTHER DIVISIONS OF ECONOMIC BOTANY, by *George Macdonald Hocking*, Ph. D. 284 pages. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price $9.75.

This compilation of words and expressions relating principally to natural medicinal and pharmaceutical materials, and the plants and animals from which they are derived, is, according to the author, "designed to meet the special needs of students and practitioners in the various health professions, of people in trade and industry, and of others interested in learning more about useful plants and animals."

Although the utmost credit is due any author who would attempt to compile a dictionary of this type, it is doubtful if any of the purpose has been achieved except that portion referring to the needs of students and practitioners. As reference material for those engaged in the study of pharmaceutical materials, this volume is of unlimited value. There has always been the need for a comprehensive and convenient listing of facts such as are found in this dictionary. The coverage of material is excellent, although the definitions are not uniform in the amount of material furnished. This is obviously due to the desire to keep the volume to a reasonable, convenient size.

As for the "people in trade and industry," and those "interested in learning more about the useful plants and animals," it is believed that a more complete and interesting discussion of each item will be sought, even at the expense of the time and energy required to obtain this information from other sources.

The appendixes are a valuable addition to the volume and contain much in the way of useful, sought-after information.

—*ELWOOD M. WRIGHT, Col., MSC, USA*

THE MEDICAL DEPARTMENT OF THE UNITED STATES ARMY. United States Army Dental Service in World War II, by *George F. Jeffcott*, Colonel, DC, USA. 362 pages; illustrated. Prepared in the Historical Unit, Army Medical Service. Editor-in-Chief, Colonel *John Boyd Coates, Jr.*, MC. Office of the Surgeon General, Department of the Army, Washington, D. C., 1955. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price $3.25.

A wealth of detailed and well-documented information on all aspects of the Dental Service operation during World War II is contained in this recently published work.

Historical material dating back to the beginning of organized military dentistry and continuing through World War I and the years following that conflict furnishes an excellent background for the chapters that follow. Administration, procurement and training of personnel, equipment and supply, and operation of the Dental Service in the Zone of Interior and in Theaters of Operation are all thoroughly covered in this volume, with a closing chapter on demobilization.

Throughout the text, the author presents an unbiased and factual discussion of interprofessional problems encountered at all levels of operation.

The book is more than a history in that it contains many charts, graphs, and extracts of regulations and official communications, providing detailed and authoritative data on the immensity of the task faced by the Dental Service.

Officers of the Army Dental Corps and other service dentists, especially those concerned with staffing and procurement, will benefit from a thorough reading of this excellent publication.

—*DONALD C. HUDSON, Col., USAF (DC)*

QUICK REFERENCE BOOK FOR NURSES, by *Helen Young*, R. N., and *Eleanor Lee*, R. N. 7th edition. 727 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1955. Price $4.

This is an extensive revision of a standard reference book for nurses which, prior to this edition, was last revised in 1950. The sections on pharmacology, medical and surgical nursing, nursing technics, diet therapy, and maternity nursing include many changes in the treatment of patients that have taken place during the past five years. The section on pharmacology is particularly excellent. Discussion on obsolete drugs has been deleted while much has been added concerning new drugs. Another new feature is the alphabetical index.

This book is highly recommended for both student and graduate nurses and should be made available to ward libraries. The compact size makes it ideal for nurses in private practice who wish to have an easy reference book at hand. It would also provide quick refresher material for nurses who have been inactive in the field of nursing and wish to return to an active status.—*ANN M. WITCZAK, Maj., ANC, USA*

THE YEAR BOOK OF PEDIATRICS (1955-1956 Year Book Series), edited by *Sydney S. Gellis*, M. D. *Isaac A. Abt*, M. D., Editor Emeritus. 431 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1955. Price $6.

This Year Book consists of well-written condensations of appropriately selected articles from 84 different journals received from June 1954 through May 1955.

The selections were well chosen to present a balance in fields particularly pertinent to the pediatrician and to include new subjects, previously neglected subjects, and controversial articles. Some of the latter were controversial in that they were possibly misleading by title or by emphasis. Some articles were apparently chosen as object lessons, such as the eight cases of Kaposi's varicelliform eruption. The editor's comment emphasized the "hazard of admitting patients with eczema to a ward housing a patient with Kaposi's varicelliform eruption."

Some 70 succinct comments by the editor and 96 solicited comments from well-chosen consultants greatly enhance the value of this book by presenting another viewpoint on controversial subjects.

I was particularly interested to note that over 40 per cent of articles selected were taken from journals published outside the United States and that only about one third of all the articles were from *Pediatrics*, *The Journal of Pediatrics*, and *The American Journal of the Diseases of Children* combined.

Articles are grouped by subject in 18 major divisions with liberal cross references and adequately indexed so that the reader can easily find, compare, and evaluate for himself current theories and findings.

—*JOHN P. FAIRCHILD, Lt. Col., MC, USA*

POLYCYTHEMIA, Physiology, Diagnosis and Treatment Based on 303 Cases, by *John H. Lawrence*, M. D., D. Sc., F. A. C. P. 136 pages; illustrated. Modern Medical Monographs Number 13. Grune & Stratton, Inc., New York, N. Y., 1955. Price $5.50.

This little book by the foremost authority on this disease presents another excellent summary of present knowledge of polycythemia in all its forms. Dr. Lawrence first applied artificial radioactive isotopes therapeutically in 1936. Their first polycythemia patient was treated in 1938 and is still living at age 72. Nearly normal life expectancy has been achieved through radioactive phosphorus in the treatment of polycythemia vera. It was the reviewer's privilege to attend a postgraduate symposium 10 years ago, at which time conclusive evidence of control of this blood disorder had already been established. Since that time considerable refinement in diagnosis, classification, therapy, and management has been realized. Furthermore, the prognosis can be confidently predicted.

In addition, this monograph includes the discussion of "relative polycythemia" and "secondary polycythemia." The distinction is im-

portant for those planning to qualify for specialty status. Many textbooks still contain erroneous information which arose from confusion of these two conditions with the disease first described by Vaquez and Osler. Pertinent case histories and excellent charts, graphs, nomograms, and color photographs are included. Also, a summary of postmortem findings on 21 cases is tabulated.

The exhaustive list of 209 references is undoubtedly the most elaborate ever compiled. The index is adequate for a small monograph.

Many technical points of interest both to the average clinican and the hematologist appear throughout the book. It is easily read, is recommended as a final authority for students and clinicians, and should serve as a reliable reference for those who infrequently are confronted with the differential diagnosis and therapy of polycythemia.

—JACK C. SHRADER, Lt. Col., USAF (MC)

THE PHYSICIAN AND THE LAW, by *Rowland H. Long.* Foreword by *Milton Helpern,* M. D. 284 pages. Appleton-Century-Crofts, Inc., New York, N. Y., 1955. Price $5.75.

This practical study forces a physician to look at himself through a lawyer's eyes. Written in terse, legal style, its compact size is deceptive as to scope, detail, and excellent documentation (369 topical references). In a way, it is complementary to that monumental work on forensic medicine of the New York region, *Legal Medicine, Pathology and Toxicology* by Gonzales, Vance, Helpern, and Umberger.

Likewise, the author shows a physician how his legal colleague tries to think and write, to be coolly objective and rational, and to be partisan without being unfair or ignorant of the other side of the argument. Also, the writer's message can help teach what most physicians learn too late—that the law in practice is neither a Hollywood show nor a set of formulas. Too often, a physician in legal matters is as out of step as a man who tries to play chess without knowing the rules. A legal action seeks a decision acceptable to society. This is the fundamental aim of legal conflict, not the interesting and even possibly important side issues that may be evoked. Much of the pattern and formality of modern American law shines through this book.

The preface sets forth two purposes—to afford some knowledge of the rules of law involving physician-patient relationships, and to help the physician who has to appear in court as a witness. The author secondarily and possibly unwittingly indicates the importance he ascribes to the different aspects of his study by the number of pages he devotes to each subject. Roughly, 20 per cent of the book is on malpractice, the same amount on sudden and unexpected death, a bit less on the physician as an expert witness, about 10 per cent on the physician and the criminal law, and 10 per cent on blood tests and transfusions, with lesser discussion of commitment of the insane, artificial insemination, adoption, licensure, workmen's compensation, and insurance. Much of current interest in more general or administrative areas has been omit-

ted, particularly regarding the coroner system, public health and governmental medicine, and industrial practice.

While much in this work is technical and for reference, it also concerns two areas that can cause difficulty and some embarrassment to all physicians. The first is the increasing demand for scientific evidence and for expert medical testimony. The author tells the physician as an expert what his good sense should suggest, that he is not expected to be omniscient but merely well prepared, modest, and understandable. He should answer the question asked, but not hesitate to admit ignorance. He should remember that his answers are ultimately weighed for value by the judge and the jury and not by the examining attorney. The second problem all physicians have is the increasing liability of being involved in a malpractice suit. One can quote the legal saw, "sue him with the deepest pockets," to explain this increase but there may be more to it than that. The writer discusses past causes for suits for damages, prophylactic steps to avoid these situations, and the defenses once involved.

This is a rather shocking book for the average physician. It describes the dangers and perils of practice, as well as some incompletely understood duties to society. While it could be considered a basic reference for lawyers, any physician can well afford this meaty, small volume in his library and, in any event, should remember to mention it to his own legal counselor or colleague in any future affair involving the physician and the law.—*CARL J. LIND, Jr., Col., MC, USA*

TOPLEY AND WILSON'S PRINCIPLES OF BACTERIOLOGY AND IMMUNITY. Volumes I and II. By *G. S. Wilson,* M. D., D. P. H., and *A. A. Miles,* M. D. 4th edition. 2,330 pages; illustrated. The Williams & Wilkins Co., Baltimore, Md., 1955. Price $24.50 for set of two volumes.

The nine-year interval between the third and fourth editions of this standard text has witnessed numerous developments in the field. In accomplishing the task of extensively revising their volumes, the authors have chosen to revise on a chapter-by-chapter basis rather than use an entirely new format. This has been successfully accomplished by enlarging the text by over 200 pages and adding extra figures and tables.

Some of the more notable features of the revision are found in the chapters dealing with the sources and effects of the newer antibiotics, bacterial genetics (including discussions of such notable advances as the phenomena of recombination and transduction), and the sections on virology.

The text is well written and ideas are clearly expressed. The print is easily read and, although there is a slight glaze to the paper, it is not fatiguing to the eyes. The binding is sturdy and well styled as is typical of books from this publisher. In general, the figures are of good quality, but the lack of color plates is quite obvious.

There is no doubt that the authors have made a very successful revision of their text, but in so doing, have pushed it further into the classification of a reference work to be used and enjoyed primarily by workers who are already well established in the field. The voluminous accumulation of facts makes the book a rather dubious source of general knowledge for the general practitioner.

—BRUCE H. SMITH, Comdr., MC, USN

MEDICAL AND PSYCHOLOGICAL TEAMWORK IN THE CARE OF THE CHRONICALLY ILL, edited by *Molly Harrower*, Ph. D. American Lecture Series, Publication No. 276, A Monograph in The Bannerstone Division of American Lectures in Psychology, edited by *Molly Harrower*, Ph. D. 232 pages. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price $5.75.

This monograph presents the proceedings of a three-day conference on problems relating to medical and psychologic teamwork in the care of the chronically ill. Participants in the conference were chosen from the professional ranks of internists, clinical psychologists, and psychiatrists. The text includes chapters on the care and treatment of the chronically ill, psychologic problems of the chronically ill, problems of teamwork in the care of the chronically ill, problems in teaching and training medical and psychologic personnel for the care of the chronically ill, the pros and cons of a new medical discipline, problems of interdisciplinary research in the care of the chronically ill, and communication in teamwork for the chronically ill.

Each chapter consists of several papers in the same topic area. The proceedings are somewhat related to two main questions: (1) What can be done to assist the general practitioner and the internist to handle effectively the psychologic problems which arise in his chronically ill patients? (2) What can be done to make effective use of the technics of clinical psychology?

There is great variability in quality of the papers in the monograph, and it appears that much would be gained by a better organization and editing of the many sections. Of outstanding interest, although its relationship to the central topic is somewhat questionable, is the chapter by Kubie: "The Pros and Cons of a New Profession: A Doctorate in Medical Psychology." Among the papers are several which do not appear relevant to the problem under discussion and which might profitably be excluded from the monograph. Some of the participants show keen perception for the problems involved in psychologic teamwork in handling chronically ill patients. Their contributions appear to be well thought out, clearly presented analyses. On the other hand, some of the speakers failed to grasp the significance of the problem.

In view of the above criticism, it appears that the title of the monograph is somewhat misleading, and it is believed that this monograph would be of limited value as an explanation and elaboration of medical and psychologic teamwork in the care of the chronically ill.

—WENDELL R. WILKIN, Lt. Col., MSC, USA

THE RELIEF OF SYMPTOMS, by *Walter Modell,* M. D., F. A. C. P. 450 pages. W. B. Saunders Co., Philadelphia, Pa., 1955.

This book provides a practical guide for the relief of distressing symptoms, an important phase of medical care which has in recent years received too little attention. This unique book is based on the belief that by relieving symptoms and attacking the basic cause of the disorder at the same time, the doctor-patient relationship is improved and better results are obtained. The book is addressed largely to medical students and younger graduates in an effort to explain principles as well as provide detailed information in the art of making patients feel better. Even though the book is directed toward younger physicians, older practitioners will find it full of helpful suggestions, some of which may be new or almost forgotten because of the present trend of attacking the cause of illness rather than providing only symptom relief.

The author discusses the different drugs and other modalities commonly used to provide relief of various symptoms, and effectively evaluates those which have been found to be most useful and those which must be used with care or not at all because of undesirable side effects. The book consists of 30 chapters, the first five of which are devoted to theory. Twenty-four chapters are devoted to describing measures designed to relieve specific symptoms such as pain, anxiety, insomnia, gas, constipation, diarrhea, loss of appetite, obesity, palpitation, edema, dyspnea, cough, fever, weakness and fatigue, nausea and vomiting, vertigo, hiccups, unconsciousness, convulsions, muscle spasm, menstrual and urinary disorders, and jaundice.

—*GEORGE M. POWELL, Col., MC, USA*

TEXTBOOK OF PHARMACEUTICAL COMPOUNDING AND DISPENSING, edited by *Rufus A. Lyman,* M. D., and *Joseph B. Sprowls,* Ph. D. Consulting Editor, *George Urdang,* Ph. G., D. Sc. Nat., Sc. D. (h. c.). 2d edition. 477 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1955. Price $9.75.

The second edition follows the lead of the first in attempting to place the "making up" and "dealing out" of medicinal products on a sound scientific foundation. This text attempts to avoid the presentation of compounding and dispensing as a course in technics and applies physical chemical principles to the preparation of prescriptions.

Each chapter is written by an expert in the field covered, yet the integration of material has been accomplished in a masterly fashion. The chapters are followed by an up-to-date reference section which should prove useful to the reader who requires more background information on the subject at hand.

The text covers the full range of subjects involved in compounding, manufacturing, and dispensing of drugs, including chapters on dental prescriptions and hospital pharmacy, and has been brought up to date to include the newer drugs. Reference tables on solubility, incompat-

ibilities, and isotonic equivalency appear in this text and should be of value not only to the student but to the practicing pharmacist.

A review of this textbook would be incomplete without mention of the interesting sections on the history of dispensing, the legal aspects of pharmacy, and prescription procedure.

This book may be recommended to the teaching profession as an excellent text, to the practicing pharmacist as a valuable reference source, and to the physician interested in the art of extemporaneous prescribing.—*ROY L. MUNDY, Capt., MSC, USA*

MEDICAL SUPPORT OF THE ARMY AIR FORCES IN WORLD WAR II, by *Mae Mills Link* and *Hubert A. Coleman.* 1,027 pages; illustrated. Office of the Surgeon General, Department of the Air Force, Washington, D. C., 1955. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price $7.

The purpose and value of this extensive and interesting documentation of the medical support of the Army Air Forces (AAF) in World War II are summarized in the statement, in the foreword, of General of the Army Henry H. Arnold, Commanding General of the Army Air Forces: "The problems we have overcome in this war will not differ from possible problems of the future. The solutions will come from the things we have learned in this war. There will be nothing new facing us that has not already been answered in principle if not in practice."

Those who compiled this masterpiece of military medical history have performed an admirable task in reducing to very interesting reading a mass of statistical and historical data. The requirements of both the casual reader and the serious practitioner of aviation medicine are simultaneously met. Although the bulk of the work concerns itself with the medical service of the AAF during World War II, proper perspective is maintained in the well-constructed preface and postscript. It is essentially the story of Major General David N. W. Grant, the Air Surgeon, and all those who have preceded and succeeded him.

The central theme of the volume is the support of the combat mission of the Army Air Forces, therefore emphasis is appropriately placed on the background and reasons for major policy decisions at Headquarters, AAF. The book portrays in detail the operational medical problems encountered by the AAF and the measures used to solve them. Certain specialized clinical programs are adequately indexed but excluded from the text of the volume.

The work is exceptionally well organized; its table of contents accurately portrays the subject matter of each chapter; and comprehensive reference material follows each chapter. This book is an excellent example of balance between readability and detail, and is highly recommended for practitioners of aviation medicine and those who merely wish to learn more of its past accomplishments and its promises for the present and future.—*SPURGEON H. NEEL, Jr., Lt. Col., MC, USA*

THE YEAR BOOK OF RADIOLOGY (1955-1956 Year Book Series). Part I: Radiologic Diagnosis, edited by *John Floyd Holt*, M. D., and *Fred Jenner Hodges*, M. D. Part II: Radiation Therapy, edited by *Harold W. Jacox*, M. D., and *Morton M. Kligerman*, M. D. 413 pages; illustrated. Year Book Publishers, Inc., Chicago, Ill., 1955. Price $9.

The articles in this Year Book are abstracted from journals received between June 1954 and June 1955. Compliments are due the editors on the selection of material, the concise comprehensive language of the abstracts, and the direct manner of presentation. The illustrations are superior photographic reproductions showing the utmost in detail. Specific subjects may be promptly located by referring to the accurate and complete index.

This book will refresh the reader on articles he has read and direct his attention to material that may have escaped him. New developments in the broad field of radiology are emphasized in the introductions to the diagnostic and radiotherapy sections and allude to the new ideas and technics to follow. Practically all fields of medical endeavor are touched on in this volume, and regardless of the physician's specialty much of this book will prove to be of great interest. The frank comments of the editors, men of wide experience, enhance the reader's appreciation and evaluation of the material presented.

A comparison of this *Year Book of Radiology* with those of former years convinces the reviewer that a high standard of excellence has been set and maintained from the inception of this series to the present publication.—*ALLAN B. RAMSAY, Col., MC, USA*

PUBLIC HEALTH, Its Promise for the Future, A Chronicle of the Development of Public Health in the United States, 1607-1914, by *Wilson G. Smillie*, M. D., D. P. H., Sc. D. (Hon.). 501 pages; illustrated. The Macmillan Co., New York, N. Y., 1955.

The author's statement to the contrary notwithstanding, this *is* a history—and a very interesting and much-needed one—of the development of public health in the United States during the period 1607-1914. It is not, however, a detailed chronology but a searching appraisal of persons and events in public health as manifestations of the social growth and development of our nation.

Written by a great public health teacher and practitioner in the maturity of years and experience, this volume will be welcomed by all students of the American system. The author himself has aptly expressed the most important contribution of his work: "The historical perspective gives a student of this field a very firm foundation on which to stand. He learns from the mistakes that others have made. He becomes more tolerant and more patient. He is less insistent on getting things done—at once. All social development is a very slow and gradual process."

It is to be hoped that Doctor Smillie will reconsider his decision and continue this vital and important story.

—*JAMES H. GORDON, Col., MC, USA*

POLIOMYELITIS, Papers and Discussions Presented at the Third International Poliomyelitis Conference, complied and edited for the International Poliomyelitis Congress. 567 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1955. Price $7.50.

This book is a report of the scientific progress of the medical and allied sciences throughout the world on the efforts being put forth to combat poliomyelitis. It is an excellent compilation and organization of a mass of medical information delivered by investigators from many countries and translated from the original language into English.

Every section of this book is interesting because of its contribution to the fight against poliomyelitis; however, the section on "Infection and Immunity in Poliomyelitis" is the most interesting, particularly the papers on "Studies with Noninfectious Poliomyelitis Virus Vaccines" by Doctor Jonas E. Salk and "Avirulent Viruses for Immunization against Poliomyelitis" by Doctor Albert E. Sabin.

The charts, graphs, and tables shown with these presentations give a definite picture of the trend in which preventive medicine investigators are working to eliminate this disease, and it must have been very satisfying to those who listened to these speakers to learn a few months later that the vaccines spoken of at this conference were later successful in field trials in the United States.

Included in this publication for the first time is an address by His Holiness, Pope Pius XII and also the banquet addresses of the representative from the Western Hemisphere, Europe, and the Eastern Hemisphere.

This printing of the Proceedings of the Third International Poliomyelitis Conference in a single volume has produced a reference on poliomyelitis that can be used by all members of the medical and allied fields.

For public health and preventive medicine officers, this book should be a "must" on their current reading lists.

—*JOHN F. HARRIS, Lt. Col., MC, USA*

ACCEPTED DENTAL REMEDIES 1956, revised by Council on Dental Therapeutics of the *American Dental Association.* 21st edition. 206 pages. American Dental Association, Chicago, Ill., 1956. Price $2.

This book, published annually, "is designed to be both a listing of commercial products which are currently accepted (classified in Group A) by the Council and also a description of nearly all of the official and nonofficial therapeutic items which are of demonstrated usefulness in dental practice."

The opening chapters explain the provisions for acceptance by the Council. Official agencies and standards relating to drug products are listed, and the principles of prescription writing are briefly discussed. These are followed by chapters dealing with related therapeutic items by consideration of these items as a group and individually.

The final chapters contain formulas and tables of weights and measures, a discussion of the symptoms and treatment of acute poisoning, a bibliographic index to products not included in *Accepted Dental Remedies,* an index to other current Council reports, and an index to distributors.

This book, as an easy-to-use, well-indexed, concise, authoritative, and current source of information on the constantly changing status of dental products, is invaluable to every practicing dentist.

—DONALD B. LENKERD, Col., USAF (DC)

THE AMERICAN DRUG INDEX, by *Charles O. Wilson,* Ph. D., and *Tony Everett Jones,* M. S. 576 pages. J. B. Lippincott Co., Philadelphia, Pa., 1956. Price $5.

The American Drug Index is a well-organized work, presenting a more complete list of pharmaceuticals than any former publication of this kind. The preparations are listed alphabetically, with helpful cross-indexing, under generic names, chemical names, brand, trade, or specialty names, and synonyms in general use. Data given include generic name, chemical name or composition, manufacturer, pharmaceutical forms, size, dosage, use, and recognition by U. S. P., N. F., N. N. R., and A. D. R. If the same therapeutic agent or combination of therapeutic agents is on the market under many specialty names, these names are also listed under the generic name, with pertinent details. The cross-indexing makes it easy to find drugs or drug combinations when only one major ingredient is known.

Such a book is almost a necessity to anyone interested in keeping up-to-date on pharmaceutical preparations. New drugs, in many combinations and under many trade names, have been introduced in great numbers during recent months, so no older publication covers the field adequately. *The American Drug Index* is recommended to physicians, pharmacists, dentists, nurses, sales representatives of pharmaceutical houses, and teachers and students in pharmacy schools.

—RUSSELL L. TAYLOR, Comdr., MSC, USN

THE DYNAMIC EQUILIBRIUM OF BODY PROTEINS, Hemoglobin, Plasma Proteins, Organ and Tissue Proteins, by *George H. Whipple,* M. D. 68 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price $3.25.

This monograph consists of 64 pages and can easily be read within an hour. Throughout the book the interchange of proteins from the plasma to the other organs and structures of the body, and the physiology of protein metabolism according to the experimental investigations done by this author and others is repeatedly pointed out. All of the experimental work was done on dogs and the conclusion drawn from many of the experiments is shown in 24 diagrams and graphs.

The monograph is a concise and easily readable presentation for those interested in the field of body protein balance.

—RUSSELL H. WALKER, Capt., MC, USN

New Books Received

Books received by the *U. S. Armed Forces Medical Journal* are acknowledged in this department. Reviews of those of greatest interest will appear in a later issue.

PSYCHOSOMATIC ASPECTS OF SURGERY, edited by *Alfred J. Cantor,* M. D., and *Arthur N. Foxe,* M. D. The Proceedings of the First Annual Meeting of the Academy of Psychosomatic Medicine, held in New York City, October 1954. 220 pages. Grune & Stratton, Inc., New York, N. Y., 1956. Price $6.50.

MEDITATIONS ON MEDICINE AND MEDICAL EDUCATION, Past and Present, by *I. Snapper,* M. D. 138 pages. Grune & Stratton, Inc., New York, N. Y., 1956. Price $3.75.

SURGERY OF THE EYE: DISEASES, by *Alston Callahan,* B. A., M. S. (Ophth.), M. D., F. A. C. S. 447 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price $25.

TECHNIQUES AND PROCEDURES OF ANESTHESIA, by *John Adriani,* M. D. 2d edition. 568 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price $8.75.

CYTOLOGY OF THE BLOOD AND BLOOD-FORMING ORGANS, by *Marcel Bessis,* M. D. Translated by *Eric Ponder,* M. D. 629 pages; 427 illustrations, including 22 full-color plates. Grune & Stratton, Inc., New York, N. Y., 1956. Price $22.

PSYCHIATRY AND RELIGION, MD International Symposia No. 3, from International Record of Medicine & General Practice Clinics, Volume 168, No. 12, December 1955. Chairman: Werner Wolff, Ph. D. 62 pages. MD Publications, Inc., New York, N. Y., 1956.

SYNOPSIS OF GENITOURINARY DISEASES, by *Austin I. Dodson,* M. D., F. A. C. S., and *J. Edward Hill,* M. D. 6th edition. 330 pages; 124 illustrations. The C. V. Mosby Co., St. Louis, Mo., 1956. Price $4.85.

THE YEAR BOOK OF ENDOCRINOLOGY (1955-1956 Year Book Series), edited by *Gilbert S. Gordan,* M. D., Ph. D. 367 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1956. Price $6.

PROGRESS IN HEMATOLOGY, Volume I—1956, edited by *Leandro M. Tocantins,* M. D., with 27 contributors. 336 pages; illustrated. Grune & Stratton, Inc., New York, N. Y., 1956. Price $9.75.

PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON THE PEACEFUL USES OF ATOMIC ENERGY, Held in Geneva, 8-20 August 1955, Volume 11, "Biological Effects of Radiation." 402 pages; illustrated. United Nations Publications, 1956. Distributed by Columbia University Press, New York, N. Y., 1956. Price $8.

PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON THE PEACEFUL USES OF ATOMIC ENERGY, Held in Geneva, 8-20 August 1955, Volume 10, "Radioactive Isotopes and Nuclear Radiations in Medicine." 544 pages; illustrated. United Nations Publications, 1956. Distributed by Columbia University Press, New York, N. Y., 1956. Price $8.

A MANUAL OF PHYSICAL EDUCATION ACTIVITIES, by *Hollis F. Fait, John H. Shaw, Grace I. Fox,* and *Cecil B. Hollingsworth.* 310 pages; illustrated by *Robert J. Demarest.* W. B. Saunders Co., Philadelphia, Pa., 1956. Price $4.

DEVELOPMENT OF VERTEBRATES, by *Emil Witschi.* 588 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1956. Price $8.

A TEXTBOOK OF OPERATIVE DENTISTRY, by *William H. O. McGehee,* D. D. S., M. D., F. A. C. D.; *Harry A. True,* D. D. S., F. A. C. D.; and *E. Frank Inskipp,* B. S., D. D. S., F. A. C. D. 4th edition. 720 pages; illustrated. The Blakiston Division, McGraw-Hill Book Co., Inc., New York, N. Y., 1956. Price $14.

VIRUS DISEASES AND THE CARDIOVASCULAR SYSTEM, A Survey, by *Ernest Lyon,* M. D. 215 pages. Grune & Stratton, Inc., New York, N. Y., 1956. Price $5.75.

YEAR BOOK OF DERMATOLOGY AND SYPHILOLOGY (1955-1956 Series), by *Rudolf L. Baer,* M. D., and *Victor H. Witten,* M. D. 480 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1956. Price $6.50.

THE MORPHOLOGY OF HUMAN BLOOD CELLS, by *L. W. Diggs,* M. D.; *Dorothy Sturm,* Instructor, Memphis Academy of Arts; and *Ann Bell,* B. A. 181 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1956. Price $12.

QUANTITATIVE CHEMICAL ANALYSIS—A Basic Course in the Theory and Practice, by *Robert B. Fischer,* Ph. D. 401 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1956. Price $5.50.

BOTANY, by *Paul Weatherwax,* Professor of Botany, Indiana University. 3d edition. 509 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1956. Price $5.75.

PHYSICAL DIAGNOSIS, by *Ralph H. Major,* M. D., and *Mahlon H. Delp,* M. D. 5th edition. 358 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1956. Price $7.

HEALTH INSURANCE—WHAT ARE THE ISSUES? by the *Canadian Welfare Council.* An objective statement of differing views with a guide for discussion purposes. 60 pages. Publications Department, Canadian Welfare Council, Ottawa 3, Ontario, Canada, 1956. Price $1.

INFANT METABOLISM, Proceedings of the World Health Organization's Seminars Held at Leyden and Stockholm in October-November, 1950, conducted by *Evert Gorter, S. Z. Levine,* and *Arvid Wallgren.* Edited by *I. Herbert Scheinberg.* 435 pages; illustrated. The Macmillan Co., New York, N. Y., 1956.

THE MENTALLY RETARDED PATIENT, by *Harold Michal-Smith,* Ph. D. 203 pages. J. B. Lippincott Co., Philadelphia, Pa., 1956. Price $4.

HUMAN OVULATION AND FERTILITY, by *Edmond J. Farris,* Ph. D. 159 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1956. Price $6.50.

TEXTBOOK OF ORGANIC MEDICINAL AND PHARMACEUTICAL CHEMISTRY, edited by *Charles O. Wilson,* Ph. D., and *Ole Gisvold,* Ph. D. 3d edition. 823 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1956. Price $11.

TREATMENT OF THE CHILD IN EMOTIONAL CONFLICT, by *Hyman S. Lippman,* M. D. 298 pages. The Blakiston Div., McGraw-Hill Book Co., Inc., New York, N. Y., 1956. Price $6.

MEDICINAL CHEMISTRY, Volume II, A Series of Reviews Prepared under the Auspices of the Division of Medicinal Chemistry of the American Chemical Society, by seven authors. Edited by *F. F. Blicke* and *C. M. Suter.* 311 pages; illustrated. John Wiley & Sons, Inc., New York, N. Y., 1956. Price $10.

HISTORY OF NURSING NOTEBOOK, by *Elizabeth M. Jamieson,* B. A., R. N., and *Mary F. Sewall,* B. S., R. N. 10th edition. 80 pages. J. B. Lippincott Co., Philadelphia, Pa., 1956. Price $3.25.

A MANUAL OF ORAL SURGERY, A Step-by-Step Atlas of Operative Techniques, by *W. Harry Archer,* M. A., D. D. S. 2d edition. W. B. Saunders Co., Philadelphia, Pa., 1956.

CARDIAC PRESSURES AND PULSES, A Manual of Right and Left Heart Catheterization, by *Aldo A. Luisada,* M. D., and *Chi Kong Liu,* M. D. 116 pages; illustrated. Grune & Stratton, Inc., New York, N. Y., 1956. Price $6.

HUMAN PERSPIRATION, by *Yas Kuno,* M. D. American Lecture Series, Publication No. 285, A Monograph in The Bannerstone Division of American Lectures in Physiology, edited by *Robert F. Pitts,* M. D., Ph. D. 416 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price $9.50.

COMPLETE MOUTH REHABILITATION THROUGH CROWN AND BRIDGE PROSTHODONTICS, by *Harry Kazis,* D. M. D., and *Albert J. Kazis,* D. M. D. 392 pages; 551 illustrations on 332 engravings. Lea & Febiger, Philadelphia, Pa., 1956. Price $15.

ADVANCES IN INTERNAL MEDICINE, Volume VIII, edited by *William Dock,* M. D., and *I. Snapper,* M. D. 366 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1956. Price $9.

ORAL CANCER AND TUMORS OF THE JAWS, by *George S. Sharp,* M. D.; *Weldon K. Bullock,* M. D., M. Sc. (Path.); and *John W. Hazlet,* D. D. S. 560 pages; illustrated. The Blakiston Div., McGraw-Hill Book Co., New York, N. Y., 1956. Price $15.

PROCEEDINGS OF THE ROUND TABLE ON LYSERGIC ACID DIETHYLAMIDE AND MESCALINE IN EXPERIMENTAL PSYCHIATRY, Held at the Annual Meeting of the American Psychiatric Association, Atlantic City, N. J., 12 May 1955. Edited by *Louis Cholden,* M. D., Chairman. 85 pages; illustrated. Grune & Stratton, Inc., New York, N. Y., 1956. Price $3.

A NEW PSYCHOTHERAPY IN SCHIZOPHRENIA, Relief of Frustrations by Symbolic Realization, by *Marguerite Sechehaye,* translated by *Grace Rubin-Rabson,* Ph. D. 199 pages. Grune & Stratton, Inc., New York, N. Y., 1956. Price $4.50.

COLLECTED PAPERS OF THE MAYO CLINIC AND THE MAYO FOUNDATION, edited by *Richard M. Hewitt,* M. A., M. D.; *John R. Miner,* Sc. D.; *James R. Eckman,* M. A., Ph. D.; *M. Katharine Smith,* B. A.; *Carl M. Gambill,* M. D., M. P. H.; *Florence Schmidt,* B. S. E.; and *George G. Stilwell,* M. D. Volume XLVII, 1955. 791 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1956.

ENDOGENOUS UVEITIS, by *Alan C. Woods,* M. D., with illustrations by *Annette Smith Burgess.* 303 pages; illustrated. The Williams & Wilkins Co., Baltimore, Md., 1956. Price $12.50.

TREATMENT OF HEART DISEASE, A Clinical Physiologic Approach, by *Harry Gross,* M. D., and *Abraham Jezer,* M. D. 549 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1956.

THE LUNG AS A MIRROR OF SYSTEMIC DISEASE, by *Eli H. Rubin,* M. D. 288 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price $12.50.

THE NEUROSURGICAL ALLEVIATION OF PARKINSONISM, by *Irving S. Cooper,* M. D., Ph. D., F. A. C. S. 104 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price $8.50.

CLINICAL SELECTIONS IN DERMATOLOGY AND MYCOLOGY, by *Frederick Rehm Schmidt,* M. D., with contributions by 36 specialists from various lands. 505 pages. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price $10.50.

BIOCHEMISTRY OF THE EYE, by *Antoinette, Pirie,* M. A., Ph. D., and *Ruth Van Heyningen,* M. A., D. Phil. 323 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price $7.

PROGRESS IN PSYCHOTHERAPY, 1956, edited by *Frieda Fromm-Reichmann,* M. D., and *J. L. Moreno,* M. D. 352 pages. Grune & Stratton, Inc., New York, N. Y., 1956. Price $8.50.

CLINICAL HEMATOLOGY, by *Maxwell M. Wintrobe,* M. D., Ph. D. 4th edition. 1,184 pages; 236 illustrations and 20 plates, 18 in color. Lea & Febiger, Philadelphia, Pa., 1956. Price $15.

A TEXTBOOK OF PATHOLOGY, by *E. T. Bell,* M. D. Contributors: *B. J. Clawson,* M. D., and *J. S. McCartney,* M. D. 8th edition. 1,028 pages; 545 illustrations and 5 plates in color. Lea & Febiger, Philadelphia, Pa., 1956. Price $14.50.

THE RECOVERY ROOM, Immediate Postoperative Management, by *Max S. Sadove,* M. D., and *James H. Cross,* M. D., with contributions by 24 authorities. 597 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1956.

PATTERNS OF MOTHERING, Maternal Influence During Infancy, by *Sylvia Brody,* Ph. D. Introduction by *Rene A. Spitz,* M. D. 446 pages. International Universities Press, Inc., New York, N. Y., 1956. Price $7.50.

ELECTRODIAGNOSIS AND ELECTROMYOGRAPHY, edited by *Sidney Licht,* M. D. Volume One of Physical Medicine Library. 272 pages; 90 figures. Elizabeth Licht, Publishers, New Haven, Conn., 1956. Price $10.

MORAL HANDBOOK OF NURSING, A Compendium of Principles, Spiritual Aids, and Concise Answers regarding Catholic Personnel, Patients, and Problems, by Reverend *Edward J. Hayes,* Reverend *Paul J. Hayes,* and *Dorothy Ellen Kelly,* R. N. Chief Moral Consultant: Very Reverend *Francis J. Connell,* C. SS. R., S. T. D., LL. D. Chief Medical Consultants: *Samuel A. Cosgrove,* M. D., F. A. C. S., and *Robert Cosgrove,* M. D., F. A. C. S. 180 pages. The Macmillan Co., New York, N. Y., 1956.

BLAKISTON'S NEW GOULD MEDICAL DICTIONARY, A modern comprehensive dictionary of the terms used in all branches of medicine and allied sciences, including medical physics and chemistry, dentistry, pharmacy, nursing, veterinary medicine, zoology and botany, as well as medicolegal terms, edited by *Normand L. Hoerr,* M. D., and *Arthur Osol,* Ph. D., with the cooperation of an editorial board and 88 contributors. 2d edition. 1,463 pages; 252 illustrations on 45 plates, 129 in color. The Blakiston Division, McGraw-Hill Book Co., Inc., New York, N. Y., 1956. Price $11.50.

U. S. GOVERNMENT PRINTING OFFICE : 1956 O - 392347